FALL 1984

ELECTRIC PERSPECTIVES

COVER

Photovoltaic array on Georgetown University's Intercultural Center, page 20. Photo by Charles Feil.

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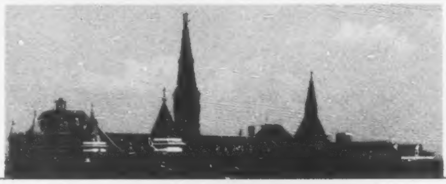

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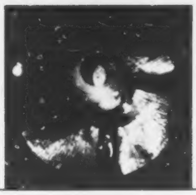

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MANAGING NUCLEAR WASTE

A 'remarkable piece of legislation' finally provides a plan for the nation's first permanent repository for spent reactor fuel.

For decades, spent nuclear fuel containing high-level radioactive waste from the nation's nuclear power generating facilities has been in "temporary" storage at individual reactor sites while federal government plans for promised long-term storage and commercial waste reprocessing have come and gone. Many utilities now are running out of storage space. Current estimates are that, by the year 2000, commercial nuclear reactors will have produced some 49,500 metric tons of spent fuel—almost 5 times more than exists at present.

Recognizing the growing severity of the nation's nuclear waste storage problem, in December 1982 Congress passed the Nuclear Waste Policy Act of 1982 (NWPA). It authorizes the Department of Energy (DOE) to plan and build the first permanent geologic repository for commercial nuclear waste in the United States by 1998. The entire $20 billion plus cost of the project, expected to be the largest civil works project in the nation's history, will fall to the ratepayers of those electric utilities that own and operate nuclear power plants.

Because the electric utility industry and its customers have such a large stake in this project and its outcome, the Utility Nuclear Waste Management Group (UNWMG), an industry organization that includes 41 utility members and three allied associations, is stepping up its activities related to the implementation of the law. Recently, Washington, D.C., freelance writer Leslie Braunstein talked with James B. Hall, Program Manager of the UNWMG, to get his perspective on the progress and implications of the project. A recently retired U.S. Army Colonel, Hall spent much of his 26-year military career managing construction projects worldwide for the Corps of Engineers. He joined UNWMG in May of this year.

EP: What are the government's current plans for dealing with commercial nuclear waste?

Hall: Since the mid-1950s, the federal government has considered plans to dispose of high-level radioactive wastes in deep, stable geological formations. Those plans, however, met with less than complete acceptance by federal, state, and industry representatives who kept looking to alternatives to geologic disposal, such as space and ocean disposal. Now, however, there is the Nuclear Waste Policy Act of 1982. Passed by a lame duck Congress without a conference, it is a remarkable piece of legislation.

The law codifies the geologic disposal technology. It calls for the Department of Energy (DOE) to form an Office of Civilian Radioactive Waste Management, with a Presidentially appointed director reporting directly to the Secretary of Energy and responsible solely for waste disposal. After two acting directors, Robert Morgan and Michael Lawrence, Benjamin Rusche was recently confirmed as director of that office. He is now assembling his staff. Rusche served for many years with DuPont and also as the Nuclear Regulatory Commission's (NRC) Director of Reactor Regulations.

In addition to establishing the office, DOE was to issue a mis-

Utility Nuclear Waste Management Group Program Manager James B. Hall

sion plan providing a schedule for building the nation's first geologic repository by 1998. A preliminary version of a mission plan was distributed on December 28, 1983. DOE issued a more comprehensive two-volume Draft Mission Plan on May 8 of this year, calling for comments to be submitted by July 9. We submitted a 41-page comment. I understand the Department received about 3,000 comments on individual items altogether. DOE must address and evaluate all of these comments, and then finalize the mission plan. The finalized mission plan was originally scheduled to come out in August or September; now it's not expected until the end of the year.

EP: What happens after that?
Hall: Before the repository is built, a site must be selected. Based on previous studies, nine sites are under consideration for the first repository. DOE must nominate five sites and then recommend three sites to the President by January 1985 for site characterization. After DOE conducts characterization studies on each of the three sites, the President is to make a final site recommendation to Congress. Although the NWPA called for the recommendation by 1987, the current mission plan allows for the final site selection to slip until 1990. We're urging DOE to try to meet a date close to the 1987 date mandated by the legislation.

EP: Where are the nine candidate sites?

Hall: There are three potentially acceptable sites in salt domes located just north of the Gulf of Mexico. Two are in Mississippi and one is in Louisiana. Then there are two in north Texas salt formations known as the Palo Duro Basin. Two more are in Utah's Paradox Basin salt formations in the southeast part of the state. The other two are in different types of stable geological formations on federal government lands, one at the Nevada Test Site and one at the Hanford Site in southeast Washington state.

EP: Will there be objections to the site selection?
Hall: Very likely. DOE is supposed to work with state governments and Indian tribes during the site selection process. When the final site selection is made, the state can object and such an objection will stand unless both houses of Congress override the objection. States are likely to object. We've already seen states delaying the process in the development of site selection guidelines. The law called for DOE to obtain NRC concurrence of its draft site selection guidelines within six months. This NRC concurrence took one year—not six months. A major contributing factor to this delay was the large number of objections raised by the states in their review of the draft guidelines.

EP: Don't some localities actually want the repository?
Hall: The "Nimby" factor—"not in my back yard"—lives on. For example, many people living in Richland, Washington—near the Hanford Site—would support the repository. They've lived with nuclear energy for years. They know it brings in money and jobs, and they believe it's safe. But the state government objects. From a political standpoint, every governor is under much pressure from many opposing interests to object. Such pressure is hard to ignore, especially if supporters are not as numerous or as vocal as objectors.

EP: In recent years, public opposition to nuclear energy has caused major difficulties for the industry. Could the repository spark opposition along the lines of protests at Diablo Canyon?
Hall: The repository could very well incite public protest on an even greater scale than have Diablo Canyon and other nuclear power plants. There are a lot of nuclear power plants under construction, but the repository will be a single facility. As such, it will allow people to focus their anxieties on a single location. It could become quite a public concern and a media event. Are people going to lay down in the middle of the street to prevent equipment from getting through? Who knows? We

Most of the American public doesn't know about the Nuclear Waste Policy Act.

can only hope that citizens will accept this project as a necessary solution to an important problem.

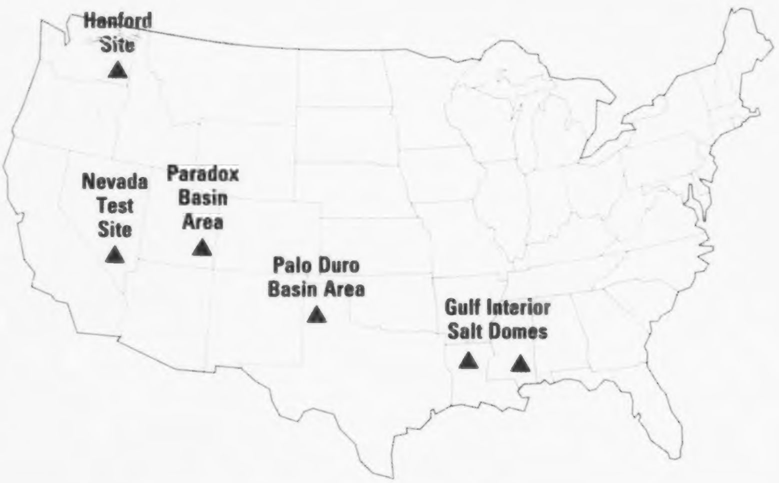
EP: How much does the public really know about this project?
Hall: Most of the American public doesn't know about the Nuclear Waste Policy Act. And much of the information that they will receive about it will be biased. The media will continue to raise the question, "How can we be assured that this waste will be stored safely for a million years?" There will always be a fraction of the public who will argue with our position. Investor-owned utilities will look to the Committee on Energy Awareness to develop a positive public information program.

Most of us think that the nuclear waste problem is exaggerated—at least as far as the technical difficulty of a solution is concerned. All of the spent fuel generated by commercial reactors by the year 2000 could be stored safely in a water basin no larger than the Lincoln Memorial reflecting pool. Of course, we will need to make sure that the proper safeguards for geologic repositories are in place. Nor should we minimize the difficulty of the political and institutional problems likely to be encountered.

EP: Since there is a possibility that the repository construction schedule will slip, what will utilities do with their accumulating nuclear waste?
Hall: The legislation is not clear on this subject. DOE states in the mission plan that it feels obligated to take title to utilities' high-level waste beginning in 1998, whether or not the repository is ready. There are several ways in which DOE could handle this waste. It could be stored at the future repository site or in transportable casks at the reactor sites. A third option, specified in both the legislation and the mission plan, is to store the waste for up to several decades in an interim monitored retrievable storage (MRS) facility. If the geologic repository is delayed significantly—DOE doesn't specify the exact number of years—then the Department may decide to build one or more MRS facilities. Using MRS, the Department could retrieve the waste sometime in the future, while safeguarding it in the present. Such facilities might add to the total cost of the nuclear waste management program because DOE would need to select another site and build another facility. DOE is studying the use of an MRS right now and will submit its study results to Congress in June 1985.

EP: How is the nuclear waste repository being financed?
Hall: The legislation calls for the program to be "full cost-recovery funded" by monies provided to the federal government from those who generate nuclear waste. In other words, utilities have to pay for their own waste disposal. The law required all waste generators to contract with DOE for disposal by June 30, 1983. That's one part of the legislation which has proceeded according to schedule—all current waste producers now have signed. There were 70 contracts signed covering 80 nuclear reactors. If a utility had

POTENTIALLY ACCEPTABLE SITES FOR THE FIRST REPOSITORY



missed the contracting deadline, NRC could have withdrawn its operating license. Any new nuclear power plant that comes on line must sign the contract with DOE when it starts producing nuclear waste.

The rate of payment is one mill per kilowatt-hour of electricity generated by the nuclear power plant. Contracted utilities are now paying about $300 million per year. This amount will increase as new nuclear power plants come on line, up to about $500 million per year. That's a great deal of money. It's handled as a fuel cost and paid on a running basis like a gasoline tax—those who get the benefits of nuclear power must pay the costs of disposal. Of course, any unnecessary delays in the schedule will only add to the cost of the program.

Our concern is that utilities and their ratepayers are paying for a service that will not be provided for 14 or 15 years, maybe longer. Our members are paying in good faith. Their plans for storing waste at reactor sites are predicated on the DOE service being available by 1998 or thereabouts. Right now the $300 million is paying for a whole host of programs—research, administrative and overhead costs, developing environmental assessments for the nine sites, providing a basis for site characterization, looking into casks for transporting and storing nuclear materials, and so on.

EP: What is the extent of UNWMG's involvement with the project?

Hall: Because our members are providing the money to obtain a service, we have two concerns: (1) that the program proceed expeditiously and be available when promised, and (2) that the ratepayers' money be spent efficiently and effectively. To address these concerns, UNWMG actively oversees DOE's implementation of the Nuclear Waste Policy Act. In existence since 1976, this group includes both investor-owned utilities and non-investor-owned utilities which operate nuclear power plants, along with Edison Electric Institute, The American Public Power Association, and the National Rural Electric Cooperative Association. We supported passage of the waste policy legislation, and after it was passed last year, we focused on the implementation of the law. For instance, we went before the NRC to urge its concurrence with the DOE site selection guidelines.

We focus two-thirds of our budgeted effort on implementation of the 1982 Act, which covers high-level waste, and one-third of our effort on the 1980 law that covers disposal of low-level radioactive wastes. Low-level waste is defined as all radioactive waste except spent fuel, reprocessing waste, and waste contaminated with transuranic elements—things such as clothing, resins, or dead animals, which came from both nuclear power plants and medical/research facilities. One of our tasks with the high-level waste program is overseeing the contracts signed between DOE and waste producers. We interact frequently with DOE, NRC, and the Environmental Protection Agency (EPA) on behalf of member utilities. We are a constructive critic—reviewing, making suggestions, and so on. In the future, we expect to be more active in the regional programs.

Recently we have provided input to DOE in developing the repository site selection guidelines and in seeking modifications of the standard DOE/utility contract for waste disposal. We've had extensive interactions, both formal and informal, with DOE regarding its implementation of the repository program and management of the waste fund. We've provided informal input to EPA when it was developing its high-level waste disposal standards. In addition, we've worked extensively with NRC in regard to rules for spent fuel storage.

EP: You're concerned with the total cost of the project and how the money is being spent. How much will the repository cost, and how much of that could be considered direct cost?

Hall: We don't have detailed cost figures yet, but the latest estimates of the repository's total cost range from $19 to $25 billion, making it the most expen-

sive civil works project in the nation's history. Only about $7 billion of that total is earmarked for life cycle costs of the first repository. Development and evaluation costs also are expected to be at least $7 billion. Much of the total cost will go for litigation and research. We don't argue the need for research; we simply ask, "How much is needed to meet our goals?"

EP: Considering the tremendous differences between the original cost estimates and final costs of recently built nuclear power plants, don't you think that the repository will be subject to the same kind of virtually uncontrollable cost escalation?
Hall: If we were to proceed rapidly with construction of the repository, and not spend so much on research and development, the amount currently budgeted would be generous. This isn't a high-temperature or high-pressure system; it's based on digging holes in the ground. But right now the facility is not even designed—we're still selecting a site. The numbers that we have are as good as DOE can come up with right now. If the cost does go up, the utilities will pay more. The law provides DOE with an opportunity to adjust the fee for its waste management services. We hope that by good management and adherence to the schedule, costs can be controlled.

EP: UNWMG and Edison Electric Institute jointly submitted comments on the draft mission plan to DOE. What were some of your major concerns?
Hall: One of our main concerns is that the mission plan contains no clear waste acceptance schedule—one that details what services a utility can receive for the money it's paying. We would like an unequivocal statement regarding DOE's obligation to dispose of the nuclear waste. Utilities need to plan in advance for waste storage, and they need to know just what the government will take and when it will take it. When DOE does take title to the waste, we want them to take it away from the reactor sites.

EP: Can DOE make such an unequivocal promise if it isn't sure when the repository will be finished?
Hall: I think we should start with the premise that the 1998 goal is clearly achievable. From the utilities' standpoint, we would like to see that goal pursued, with the view that all these institutional problems will not be allowed to delay the project. If you start with the premise that there will be delay, then it becomes a self-fulfilling prophecy. Our comments urge DOE to try every possible means of achieving the goal established by Congress. With that timeline set and the funding mechanism established, the only remaining issues are the strategy and methodology by which DOE attempts to meet its goals. We suggest using a systems optimization approach: adopting the approach that offers the best chance of success. You can plan to build the Taj Mahal or you can build a useful, workable structure. For instance, DOE probably could move a lot more rapidly by choosing those technically acceptable sites affording the greatest degree of public acceptance. That type of choice would speed up the process of obtaining permits and proceeding through the licensing process. Similarly, we are urging DOE to avoid spending too much time and money on site characterization; close coordination with the NRC will help greatly in that regard. These sites have been studied previously, some more than others. At one time, they even had begun test drilling at Hanford. The concept of geologic disposal is not new, either here or overseas. I think that Congress realized the necessity of sticking to a schedule when it made the Waste Policy Act so specific. I'm not aware of any other Congressionally mandated construction program that is as specific as this Act.

EP: Despite the Congressionally mandated deadline, the program is already delayed. What delays have occurred so far? Do you think that they can be overcome?
Hall: As I mentioned, NRC recently approved site selection guidelines after one year rather

> ***I personally think that the project deadline mandated by Congress could be met . . .***

than six months. The Project Decision Schedule is needed now, and I understand DOE is working on that schedule. However, you must have a plan before you have a schedule, and they have not finalized or specified their plan. The revised mission plan is not expected until the end of the year. Perhaps most importantly, though, DOE has said in the latest draft mission plan that it expects a delay of three years in completing site characterization and selecting the first site—from 1987 to 1990. Obviously this delays the entire program. I personally think that the project deadline mandated by Congress could be met, but such projected delays this early aren't encouraging.

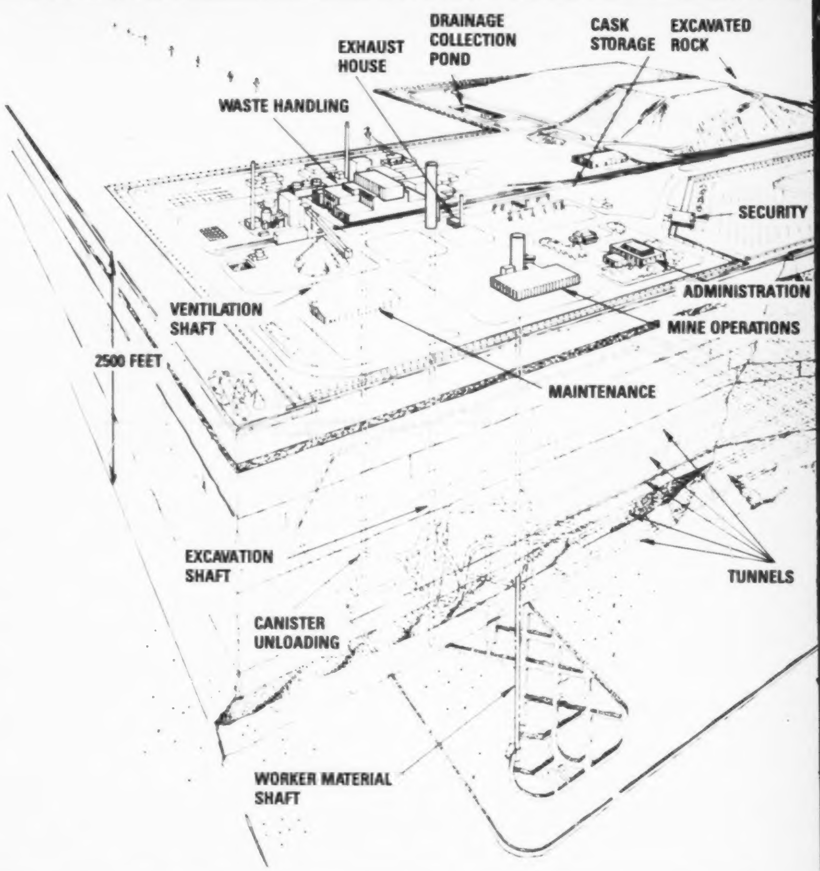
EP: What about licensing? Won't it be problematical to license a prototype facility?
Hall: DOE and NRC will be cooperating to determine the arrangements for licensing the repository. The process will be complex to ensure that safeguards are met. It is important that close coordination between DOE and NRC is established early and maintained. DOE is not familiar with the licensing process because its defense nuclear waste work does not require licensing. We said in our comments that is not too early for DOE and NRC to begin planning and cooperating for the licensing process.

EP: Does the plan for disposing of commercial nuclear waste affect defense nuclear waste?
Hall: The commercial repository may take in defense nuclear waste as well. According to the Nuclear Waste Policy Act, the President must inform Congress by January 1985 whether or not defense waste needs to be stored separately. If the President is unable to justify the need to store defense waste separately, then the Department of Defense will use the DOE repository and share its cost. The current volume of defense waste exceeds that of commercial waste, but its total radioactivity is less.

EP: When DOE implements a new technology, it usually has test and demonstration projects. Why did DOE decide to skip this step with the repository program? And why did it opt for one nationwide repository rather than several decentralized ones?

Hall: The current mission plan does not call for a test or demonstration facility. The Nuclear Waste Policy Act authorized DOE to build a deep geologic

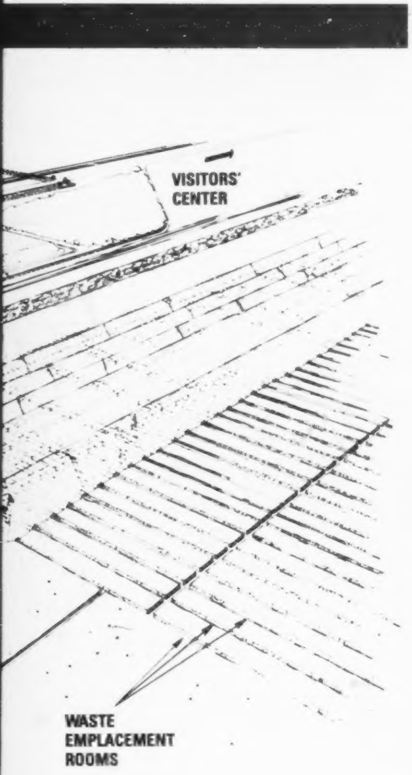
ARTIST CONCEPT OF REPOSITORY SURFACE SUPPORT AND UNDERGROUND FACILITIES



. . . most of the effort will involve application of known technologies.

Test and Evaluation Facility, but did not require the Department to do so. In the mission plan draft, DOE has concluded that a separate testing facility is not needed. If the Department does decide to build one, it will probably be at the repository site. That decision should come by 1987.

DOE still has not determined at this early date how many repositories might ultimately be required. Although the program is heavily focused on completing the first repository, the Act actually requires two repositories to be built—the first by 1998 and the second after the year 2000. Will one be in the East and one in the West? Will they both be in the same area? Such questions remain to be answered. From a transportation standpoint, it would seem to make sense to have the repository located as close as possible to the area where the most nuclear waste is generated. Minimizing the distance between reactor sites and repository could cut transportation costs dramatically. Most of the nation's nuclear power is generated in the industrial and heavily populated Northeast. But many other factors must be considered in the site selection process—geo-technical considerations, environmental impacts, socioeconomic impacts, public acceptance, political considerations, to name a few.



EP: What will the permanent repository actually be like? How much waste will it hold?

Hall: The repository will consist of a series of deep underground caverns whittled out of rock, one-quarter to one-half mile under the surface. Waste canisters will be placed in the caverns, and then the caverns will be backfilled. At the surface there will be facilities for receiving, handling, and emplacing the waste in the underground disposal rooms. Depending on the type of transport and disposal canisters used, there also might be facilities for consolidating or repackaging the waste. When the repository has been filled to capacity, the surface facilities will be decommissioned, and the repository sealed permanently.

The Act requires that the second repository be in operation before the first repository exceeds 70,000 metric tons of heavy metal in spent nuclear fuel, or the quantity of high level-waste resulting from the reprocessing of such a quantity of spent nuclear fuel. Current estimates indicate that the second repository would begin operation about six years after the first repository. It too, would have a planned 70,000-metric-ton capacity. The two repositories would accomodate all commercial wastes anticipated to be generated by 2020.

EP: Will new technology be required to store and safeguard the waste?

Hall: We will need some basic research to find the right package to contain the waste in a geologic structure over many years. We will need to study the effects of radioactivity on rock over a long period of time. But most of the effort will involve application of known technologies. We've been building hot cells for packaging radioactive material for 30 years. And as for the disposal techniques themselves, it's really just underground mining in reverse. We don't have to invent anything for mining and digging. It's not "high-tech." And while a repository will create some jobs, most won't be high-tech jobs. ▰

CANCER IN THE GARDEN OF EDEN

'. . . despite abundant scientific evidence of natural carcinogens, governmental agencies fail to report on most of them and instead issue warnings only about industrial carcinogens.'

By Edith Efron

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For several decades—since the publication of *Silent Spring* by Rachel Carson—our nation's efforts to combat cancer have been dominated by a religious-political view of man, nature, and society. I call the environmental scientists and government regulators who adhere to this ideology "The Apocalyptics," in that, with little or no data, they have ceaselessly projected the catastrophic destruction of life on earth by industrial civilization. Where apocalyptics are concerned, cancer is fundamentally a modern moral and political disease caused by the human evils of intellectual arrogance and greed. Ninety percent of it, they have said, comes from "the Faustian sin"; from man's arrogant conquest of nature; from post-World War II science, technology, economic growth, and affluence; from the primary values of the Industrial Revolution and Western civilization and, not infrequently, from capitalism, the market, and profits. Carcinogens, the apocalyptics have said, are predominantly synthetic substances, almost never to be found in nature, and are primarily industrial artifacts. Industrialized America, they have told us for 20 years, is a carcinogenic hell.

The apocalyptics' theory of cancer is an ideological fairy tale, and it clearly emerged from scientists who had not read the literature of their field. Nothing demonstrates this more dramatically than the enormous body of nonapocalyptic literature which has been accumulating since the 1920s, indicating that nature itself is teeming with carcinogens as well as with substances that damage genetic material, known as mutagens. Even as Americans were being taught in the 1960s and 1970s that industry was despoiling the Garden of Eden, the scientific literature was indicating that the planet is permeated with materials that are reported in laboratory tests to cause cancer and mutation: radiation, minerals, metals, volcanic aerosols, fossils, viruses, bacteria, molds, trees, plants, fruits, vegetables, birds and other animals—and the many products of pyrolysis, or fire. Air, water, soil—all contain suspected carcinogens, and so does man himself. Among those reported are natural human hormones: estradiol, estrone, estriol, progesterone, and testosterone.

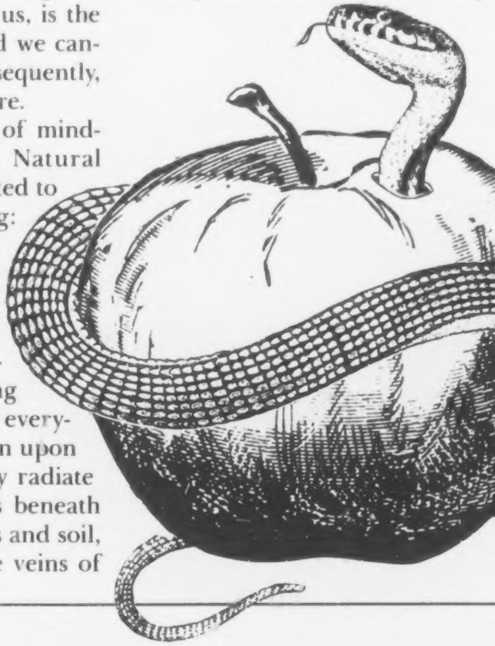
Perhaps the most startling to a public reared on the Garden-of-Eden theory are the natural carcinogens in our food supply and our cooking. By the mid- and the late '70s, the following had been reported to be carcinogenic based on animal tests, or mutagenic in tests on bacteria: coffee beans, tea leaves, spices (nutmeg, mace, ginger, star anise, cinnamon, and black pepper); fruits that contain the mutagen acetaldeyde (apples, grapefruits, peaches, pears, pineapples, raspberries); plant oils (cottonseed); foods with the carcinogen malonaldehyde (raisins, walnuts, peanut butter, cooked fowl, and meats); foods contaminated by natural carcinogenic molds (apple juice, apple jam, country-cured ham, wheat, barley, rye, coconut, millet, corn); some honeys; commonly eaten mushrooms; the gourmet delicacy fiddlehead fern (bracken); fresh vegetables that contain nitrates and that produce carcinogenic nitroso-compounds when combined with natural amines in such foods as cereals, fish, and tea; and Brazil nuts, which, like all foods, contain radium, but are unusually radioactive.

All the classic food-preparation methods have been reported to be carcinogenic or mutagenic in lab tests. They include smoking, salting, fermenting, malting, broiling, and frying. When exposed to fire or high heat, the most basic elements in our diet have been found—again, in lab tests—to be mutagenic: proteins, amino acids, and sugars, including sugars in starchy foods.

These are just a few categories of the natural carcinogens and mutagens which have been reported in the literature. There are many others: Every conceivable aspect of the planet has been implicated. How valid these findings are, the layman may not be able to know, but if a significant portion of them is valid, we seem to be staring at a calamity. The calamity is theoretically assured if one accepts the government's basic premise when assessing cancer risk—the so-called no-threshold theory, which holds that there is no safe dose of a carcinogen, that even one exposure to a carcinogen, however small—even as little as one molecule—may cause cancer. Although avowedly unprovable, the no-threshold or one-molecule theory is the conceptual rock on which cancer regulation is built.

When we consider the data with the no-threshold/one-molecule theory in mind we see that we are now confronting a second carcinogenic hell. The data on chemical carcinogens produced by industry have suggested that by virtue of human action, there is nothing we can breathe, eat, or drink without encountering carcinogens. The natural data suggest that by virtue of the nature of reality itself, there is nothing we can breathe, eat, or drink without encountering carcinogens. In fact, of the two carcinogenic hells, there is something even more hellish about this one. However appalled one may be by the industrial data, one is always aware, subliminally, that there is an industrial spigot, so to speak, and that for substance after substance, the spigot could be turned off. Industrial carcinogens are susceptible to political action; one can ban products, one can close factories. Hypothetically, the whole Industrial Revolution could be turned off. But the carcinogens that have been reported here cannot be turned off. This carcinogenic hell, the scientists tell us, is the planet earth itself, and we cannot escape it. It is, consequently, a more awesome picture.

It is also a picture of mind-boggling complexity. Natural carcinogens are reported to be every kind of thing: They are animate, inanimate; chemical, physical; animal, vegetable, and mineral; they are motionless crystals, flowing gases, liquids. They are everywhere: They rain down upon us from the skies, they radiate upward from crevices beneath the sea, from the rocks and soil, they flow through the veins of plants and trees, they gush out in torrents from forests. They are alive: They grow, they crawl, they bloom, they blossom. And they are inside us: They are part of our vital physiological processes; they course through our bloodstream through our hormones; they are in our saliva, in our digestive tracts. We inhale them, we drink them, and we feed on them ceaselessly, and in the act of absorbing them, we renew the needed supply in our bodies, for we cannot live without them; we ourselves are carcinogenic and radioactive beings. And even the act of dying is carcinogenic, for putrefaction, whether of plant or of animals, breeds new carcinogens. Were we to perish on a fiery bier, our broiling tissues and the very ash to which we were reduced would be carcinogenic. If these extraordinary data are valid, they tell us that in some ungraspable way the entire universe is impli-



cated in the disease that is known as cancer.

The findings from laboratory tests on natural carcinogenic and mutagenic substances have been reported in the scientific literature. But most of these findings have not been relayed to the nation, as have the reports on suspected industrial carcinogens. This absence of information cannot be attributed to the fact that the natural carcinogens have not yet been evaluated by a stellar committee; most of the reports on industrial carcinogens that have shown up in the press for a decade have not been evaluated by stellar committees either. The International Agency for Research in Cancer (IARC) in France is the only institution that engages in systematic evaluation by high standards in the field, and its first list of "established" carcinogens appeared only in 1979–1980. What proportion of the natural data is valid, by those standards, there is no way to know.

The absence from the media of most of this information about nature does not imply that such data have been kept secret. The papers and books have been freely published and are to be found in libraries, and findings are discussed at specialized cancer conferences. They are readily available to anyone who cares to hunt for them. They might legitimately be called, however, an *institutional* secret. There is no regulatory agency in charge of investigating nature. There are no Senators seeking to enhance their careers by subjecting nature to grillings under hot television lights. There is no ardent political constituency demanding that nature's chemical innovations be arrested. There are no dramatic legal contests in which nature is the defendant. And thus, there are no Xerox machines endlessly churning out government bulletins about nature's latest toxic, carcinogenic, and mutagenic derelictions and mailing them to the press.

Nature's carcinogens and mutagens are a philosophical irrelevancy to the institutions created by the apocalyptic movement. The apocalyptic assumption that nature was almost entirely noncarcinogenic and that most human cancer had emerged from post-World War II test tubes forbade the very concept of a research agency, let alone a regulatory agency, dedicated to the study of and the dissemination of information about the carcinogenicity and mutagenicity of the earth. Just as most of the scientists are still frozen in the position determined by the history of the field, so are our institutions.

And yet, investigation of nature goes on and discoveries have been filtering through the ideological curtain. Most are still unknown, but a few have finally been discovered by the heirs of Rachel Carson. Three have been particularly shocking to them:

Vinyl chloride is the very symbol of synthetic evil, but in a paper entitled "Carcinogenic Natural Products," E. K. Weisburger of the National Cancer Institute (NCI) reported that vinyl chloride is found in tobacco. It is a natural constituent of at least one plant. If this is true, *all* Americans, who live in a society of smokers, have thus been inhaling and ingesting molecules of vinyl chloride all their lives.

Benzo(a)*pyrene* is an established animal carcinogen usually linked to the energy and automotive industries. But many scientists have reported benzo(*a*)-pyrene as a natural substance which emerges from bacteria, growing plants, and above all from pyrolysis. It is present whenever one cooks one's food, whenever one burns wood, coal, or petroleum, whenever there is a wiener roast, a backyard barbecue, a bonfire, a prairie fire, or a forest fire. Here there is not even a question: *All* Americans have definitely been inhaling, eating, and drinking molecules of benzo(*a*)pyrene all their lives.

Asbestos is an established occupational carcinogen, and in 1976, Russell Peterson, chairman of the Council of Environmental Quality, informed Congress during the hearings on the Toxic Substances Control Act: "No level of asbestos fibers in tissues is regarded as safe—a single fiber may initiate a response." But asbestos is a natural substance, its fibers can be microscopically small, and they are probably part of the natural car-

There are no dramatic legal contests in which nature is the defendant.

cinogenic "background" in which we live. In 1977, a National Academy of Sciences (NAS) committee in a document called *Drinking Water and Health*, a work frequently cited as authoritative by the Occupational Safety and Health Administration (OSHA), estimated the background amounts of asbestos in the air and water. The committee said that "natural" air (air sampled in areas remote from industrial civilization) might contain about .01 fiber per cubic centimeter, and that "natural" water might contain about 10^4 to 10^6 fibers per liter. Again, if this even approaches accuracy, *all* Americans have been inhaling, drinking, eating, and washing themselves with asbestos fibers all their lives.

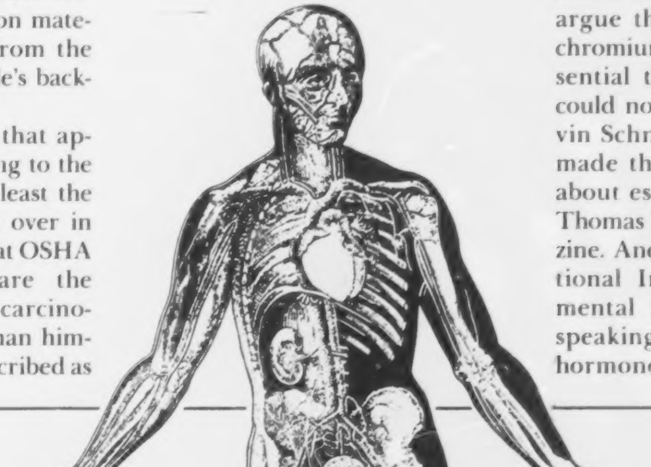
Such data obviously clash violently with the apocalyptic assumptions about nature. And, to further confuse the heirs of Carson, it was finally "discovered" in 1980—and published as news in *The New York Times*—that it was not just nuclear plants that might be leaking radioactivity into the surrounding areas, but that radioactivity was emerging from people's homes from certain natural construction materials—granite—and from the rocks and soil in people's backyard gardens.

But the discoveries that appear to be most shocking to the cancer preventers—at least the ones they have fought over in both the literature and at OSHA hearings—in 1978—are the findings on naturally carcinogenic components of man himself. Three of them, described as "established" carcinogens by the IARC, have preoccupied a great many scientists:

Nickel and chromium industries are reported to have high cancer rates—but nickel and chromium are essential nutrients for human growth.

DES, an estrogen, causes vaginal cancer in some of the daughters of the women who take the drug—but, according to IARC Monograph Vol. 6, natural estrogens and other sex hormones are carcinogens. Yet again, sex hormones are essential to human physiology.

Nitrite used to cure bacon is a chemical which, combined with the amines in industrial substances and a great range of natural foods, for example, proteins, cereals, and vegetables, produces *N*-nitroso compounds in the body—and *N*-nitroso compounds are reported to cause cancer in a *dozen-and-a-half animal species*. But, according to the IARC in 1978, 70 percent of the nitrite that enters the stomach is naturally formed in saliva; and according to Steven Tannenbaum, professor of food chemistry at MIT, "Probably thousands of times more nitrite is formed in the intestine than is contributed to the intestine from preformed nitrite in the diet." In this case, too, the human body is a natural nitrite and nitrosamine factory.



Inevitably, on learning of such findings, scientists again have taken up the lance. Within the NCI itself, Hans Falk and Herman Kraybill consider carcinogens which are required for human life to constitute major evidence that at low levels, such substances do *not* cause cancer. The NCI opposition, represented at OSHA's hearings, argued that the fact of man's need for such substances did not constitute proof that the substances were *not* carcinogenic in low doses. (As always, the theoreticians invoke or reject the fallacy of proving a negative as it suits them). Arthur Upton of the NCI stated: "I do not see that the existence of evidence for essentiality of a material as a trace nutrient is incompatible with the concept that that same material may be carcinogenic in trace amounts." Umberto Saffiotti of the NCI argued similarly that it was a "logical nonsequitur" to argue that because selenium, chromium, and nickel were essential to the body that they could not be carcinogens. Marvin Schneiderman of the NCI made the same general point about estrogenic hormones to Thomas Maugh in *Science* magazine. And David Rall of the National Institute for Environmental Health Sciences, also speaking of carcinogenic sex hormones, argued that one

. . . philosophical revisionism is now occurring in the world of regulatory science.

could not assume that there were safe or threshold doses within the body: "I know of no biochemical or physiological principle that indicates there is any reason to believe that. I find it much more comfortable scientifically to believe that they are indeed carcinogens, even at that concentration which is a biological necessity."

The nature and level of the argument was summarized by OSHA by means of a scornful joke. OSHA described the position of those who argue that chemicals required for survival cannot be carcinogenic at low doses as a "hypothesis" which "is apparently based upon an assumption that 'Nature wouldn't do it to us.'" This particular joke is genuinely funny, although not in the sense OSHA intended. The potentates of "regulatory" science would not be in their present position were it not for the hardcore apocalyptic belief that "Nature wouldn't do it to us." They rode to power on exactly that belief.

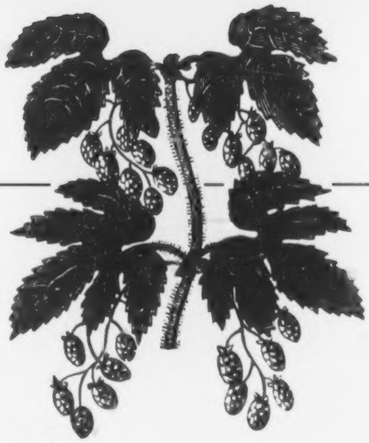
The "Nature-would-or-wouldn't-do-it-to-us" controversy is, of course, the controversy over the no-threshold theory. The quarrel over the natural carcinogens has grafted itself onto the most dramatic battle in the field. But there are two distinct audiences who are watching this drama, one in the world of chemical carcinogenesis, one in the world of radiation studies, and both have a special perspective on it. Some of the more theoretical minds in the world of chemical carcinogenesis appear to be baffled by the incessant focus on the perils of ineffably low doses, whether natural or industrial. They appear, although their dignified language camouflages it, to be asking helplessly: Where did the known danger of high doses go?

As Elizabeth Miller put it in her presidential address in 1978 to the American Association of Cancer Research: "Much data have clearly established that chemical carcinogenesis is a strongly dose-dependent phenomenon. . . . The strong dose dependence is too often slighted in public discussions of possible human hazards from mutagenic and/or carcinogenic chemicals." And Kraybill of the NCI made the same point in 1980, stating that the issue of dose dependency is never brought up in public argument over the potential threats to human beings from chemical carcinogens and mutagens.

Where *did* the high-dose danger go? It is concealed by the undemonstrable one-molecule theory itself. One cannot teach people that their greatest peril is high doses of a carcinogen while simultaneously teaching them that their greatest peril is an accumulation of submicroscopic specks of all-the-carcinogens-in-the-environment—*and* while defining the ultimate moral goal of cancer prevention as that of protecting a man who might, somewhere, sometime, be struck down by a single molecule of a carcinogen to which he is peculiarly sensitive. In the process of justifying regulatory practices and training Americans to rear, like frightened horses, at the very idea of one molecule of an industrial carcinogen or mutagen, the spokesmen for "regulatory" science have expunged the strong dose dependency of carcinogenesis from the public dialogue.

The most vocal mockers in the gallery are those scientists in the field of radiation who did not learn their lesson backward, who have always known that nature *would* do it to us, that, in fact, nature *has* done it to us, and who never forget for an instant that the earth was hurled out of a nuclear explosion in the heart of the sun and that every living being is simmering in his own, and the planet's, low-level radioactivity. The laughter of a portion of this audience is so full of contempt that it has an almost savage quality. Thus: Rosalyn S. Yalow, Nobel laureate, testified to Congress in 1979: "As an adult, living human being, my body contains natural radioactivity; 0.1 microcuries of potassium-40 and 0.1 microcuries of carbon-14. According to the current rules of the Nuclear Regulatory Commission, if I were a laboratory animal who had received this amount of radioactivity as 'by-product material' and died with the radioactivity still in my body, I could not be buried, burned, or disposed of in the garbage."

To sum up, with the belated discovery that exposure to carcinogens is inescapable, both externally and internally, philosophical revisionism is now occurring in the world of regulatory science. When OSHA takes to mocking people for believing



that "Nature wouldn't do it to us," we know we are looking at a serious corrosion of the apocalyptic premises which have shaped the profession of chemical carcinogenesis, the ideology of regulatory science, and the views of the culture itself. If Rachel Carson had been able to hear the testimony of the NCI experts at the OSHA hearings testifying in chorus to nature's malignant intentions, she would have whirled furiously in her grave. There is little question that nature's carcinogenicity and mutagenicity, which has, so far, been barely-explored, is forcing regulatory scientists into a direction for which they are unprepared. The regulatory agencies are certainly not stopping to reconsider their intellectual evolution and the fact that their basic premises emerged from discoveries made in an illogical order. They are backing into the logical perspective inch by inch like a group of nervous crabs—while still clinging to the ancient belief that their mission is to chase every man-made carcinogenic "germ" on the continent. Since they are backing into it, they will soon crash into the most appalling shock of all—that, given the radioactive-carcinogenic-mutagenic dimension of the earth, and given the one-molecule theory of cancer, they must, to be consistent, chase after every carcinogenic "germ" on the planet, including those within man himself. Because they cannot see with the backs of their heads, they do not know it, but they are in a philosophical crisis.

Within the world of regulatory science itself, one hears repeated charges of epidemic irrationality in cancer experiments, of repeated publication of unsubstantiated findings, of frantic cries of wolf, of the abandonment of scientific disciplines and standards, and of the politicization of science. Although these charges frequently betray fear of a public reaction, the reason for that fear, other than that the public might be bored with or irritated by bad science, is not stated explicitly. The implication is clear that some scientists are afraid of a laymen's rebellion of some kind, but it is difficult to imagine the American public, or even a significant portion of it, identifying and rebelling against bad science, since most have no standards for good science. (One need scarcely fear such a rebellion when the National Science Foundation and the Department of Education are reporting "a current trend toward virtual scientific and technological illiteracy.")

There is one scientist, however, who has stated explicitly of what aspects of the public reaction he is afraid—and in terms that *are* applicable to laymen. He is Joseph Rodricks of the Food and Drug Administration (FDA), and he has apparently been aware for some years of a particular threat to regulatory science that will, he believes, emerge from the public.

Rodricks, precisely because he was at the FDA and was a student of the chemistry of foods, has a broader perspective on the phenomenon of carcinogenicity than do most of his colleagues in chemical carcinogenesis who are still frozen in the historical posture of the birth of the field, and whose experimental work is concentrated on synthetic chemicals. Rodricks is aware of nature's role in the problem—at least insofar as it touches on his own field, food. In 1978, in a paper entitled "Food Hazards of Natural Origin," he opened with these words:

"Let us assume for a moment that the 19th-century revolution in the science of synthetic organic chemistry never took place and that our society is not inhabited by any of those forms of technology that depend on the achievements of this science. And then let us make a second assumption, admittedly incompatible with the first, that our health scientists are blessed with up-to-the-minute knowledge of the role of chemicals in human disease and, moreover, have access to all the techniques of modern chemistry and toxicology. An environmental scientist seeking a lifelong supply of funds in such a fancied society would be well-advised to take a close look at the food consumed by its inhabitants."

He then gave his reasons for recommending a focus on food—it exposed the people continu-

ously to the most chemically complex compounds; those compounds had, on the whole, never been identified; the toxic effects of the foods, singly or together, had never been studied; and exposures to these chemicals were largely unknown. In other words, said Rodricks, there was no reason whatever for the widespread assumption that the natural food supply was "safe." He then stressed that he was not suggesting that one abandon the investigation of chemical additives—but, he said, public health would be better served if scientists acknowledged the existence of chemical risks in natural foods and sought to reduce or eliminate them. Hazard, said Rodricks, is hazard, and "whether a chemical in food is natural or synthetic, or is an intentional additive, natural constituent, or accidental contaminant is entirely irrelevant to whether it represents a human health risk." Any other view, he said, was "simplistic." Finally, he called for "priorities" in establishing such risks, whatever their source. The rest of the paper was dedicated to a discussion of several examples of naturally toxic foods and of naturally carcinogenic molds and estrogenic substances in plant foods.

In fact, Rodrick's paper had been cautious, and his documentation limited. By that date an astonishing number of carcinogens and mutagens had been reported in the food supply. The year before, Takashi Sugimura, reporting on his work with 11 collaborators, all prominent figures in Japanese cancer research, had informed a scientific audience of some of the latest findings of "mutagen-carcinogens" in foods and cooking methods. No reflection of such data had appeared in Rodricks's 1978 paper. In the same year, however, Peter Hutt, a former legal counsel for the FDA and now a member of a law firm that has represented corporate clients, was far more loquacious on the subject. In a keynote address to a conference sponsored by the International Academy of Environmental Safety, Hutt declared: "Virtually every food product on the market today contains some constituent that has been shown to be carcinogenic in at least one animal test. . . . It would be difficult to plan a diet for even one day that would be entirely free of animal carcinogens. It would surely be impossible to live for any significant time on such a diet, in light of the utter ubiquity of such substances." And Hutt reeled off a list of reported carcinogens in various foods and their components—essential vitamins and minerals, lactose, maltose, charcoal-broiled steaks, and so on. By 1979, Jane Brody of *The New York Times* was interviewing James and Elizabeth Miller, prominent basic scientists, on the subject of naturally carcinogenic foods. According to the Millers, she said, "evidence gathered thus far indicates that there may be as many naturally occurring carcinogens as there are carcinogens conjured up in industrial laboratories." James Miller cited a few of the 30 examples of which he was aware: "Every day we eat far more estrogenic substances from plant foods than we do of DES contaminants in meat." He also mentioned aflatoxin in the nitrate-rich vegetables which, when mixed with amines in other natural foods, may form carcinogenic nitrosamines in the human digestive system.

Almost none of this rapidly growing body of information about naturally carcinogenic foods, however, was being announced to the public by the FDA, which has argued that even one molecule of a synthetic carcinogen is a hazard to the public. But two of the FDA's former legal counsels, Peter Hutt and Richard Merrill, both writing with quite different perspectives for the legal profession—Merrill being substantially more sympathetic to regulation than Hutt—explained the agency's mysterious silence on the subject. Both cited the FDA's policy on natural carcinogens and naturally carcinogenic contaminants in foods which had been published in the *Federal Register* in 1979 as follows:

"Indeed, a requirement for warnings on all foods that may contain an inherent carcino-

'Studies on the relationship of diet and nutrition to cancer should be fully supported . . .'

genic ingredient or a carcinogenic contaminant (in contrast to a deliberately added carcinogenic substance) would apply to many, perhaps most, foods in a supermarket. Such warnings would be so numerous they would confuse the public, would not promote informed consumer decision-making, and would not advance the public health."

This statement, tucked into the middle of a long opinion on reportedly carcinogenic hair dyes, had been overlooked by all but specialists in FDA regulation. The plain but astonishing fact was that by 1979, 20 years after the passage of the famous Delaney clause which forbids the inclusion of carcinogens in foods, the FDA, as a matter of policy, was refusing to warn the American people, so as not to "confuse" them, that much if not most of their food supply was contaminated with natural carcinogens or was intrinsically carcinogenic itself. The reason, said Merrill, was obvious: "The number of carcinogenic substances that naturally occur in foods would ultimately require so many warnings as to be deafening." Thus, the agency would only warn the public of "deliberately added" carcinogens, and an enormous and growing literature of experiments reporting carcinogens and mutagens in natural foods was being officially ignored. Ironically, a 1977 paper by Sugimura and his colleagues had ended with these words:

"Studies on the relation of diet and nutrition to cancer should be fully supported academically and multidisciplinarily. These studies will provide clues to ways of preventing most of the common types of human carcinogenesis resulting from exposure to mutagen-carcinogens in normal everyday life. Finally, we must say that it really seems peculiar that the importance of mutagen-carcinogens in foods has not been the main subject throughout the long history of cancer research."

It was indeed "peculiar." Yet more peculiar was the fact that even when a veritable torrent of data on the carcinogenicity and mutagenicity of natural foods and on every process of cooking had finally emerged, the FDA's lips were apparently glued together: Government science was silent on the subject.

It was in 1980 that Joseph Rodricks, then acting associate commissioner for health affairs of the FDA, stood up one day before an audience of scientists and explained why he was worried about the public. Again, he was cautious. None of this background—and certainly no hint of a conscious FDA policy of withholding such "confusing" information—was mentioned. But in a lecture at the New York Academy of Sciences on risk assessment for carcinogens, Rodricks ended with these words:

"It seems clear to me that as we begin to apply our current methods for detecting risks to some of the myriad natural components of food, it is highly probable that we shall uncover an uncomfortably large number of chronically hazardous substances. Although this should not shock anyone who understands the chemical nature of food, it will surely come as a surprise to the public. I suspect that at least two monumental dilemmas will surface:

1. The public's skepticism about the adequacy of current methods to measure risk will rise, perhaps, to unmanageable proportions.
2. If we have high confidence in the methods we now use to measure risks from synthetic chemicals, and if on the basis of such measurements, we vigorously pursue the management of such risks, how can we justify not applying the equal vigor to the management of risks from the natural components of foods?

PEAS
99 LBS. NET WEIGHT
WHOLE BEAN
UNCOATED
RICE
NUTS
TOMATO
CATSUP

"I hope my projection about uncovering numerous and hitherto unrecognized risks among the natural components of food is incorrect so that we shall not

. . . the story that cancer was invented in post-World War II test tubes is false.

have to face these dilemmas. But I fear I am right."

In the same year that this projection was being made, 1980, a scientific journal published a short article entitled: "Formation of Mutagens in Cooked Foods. III. Isolation of a Potent Mutagen from Beef." The authors were numerous and were of some interest; they included Takashi Sugimura, director of the Japanese National Cancer Center Research Institute, and John H. Weisburger, former head of the Carcinogen Screening Section and former director of the Bioassay Segment of the Carcinogenesis Program at NCI. The work had been supported in part by the NCI's U.S.–Japan Cooperative Cancer Program and the U.S. Public Health Services, as well as a group of Japanese institutions. The summary was terse:

"The major mutagenic component of fried beef has been isolated using a series of chromatographic steps. The pure compound has been analyzed. . . . The results indicate that the molecular weight of this extremely mutagenic compound is 198, with an elemental composition of $C_{11} H_{10} N_4$. The compound is different from the known mutagenic pyrolysis products of amino acids or proteins."

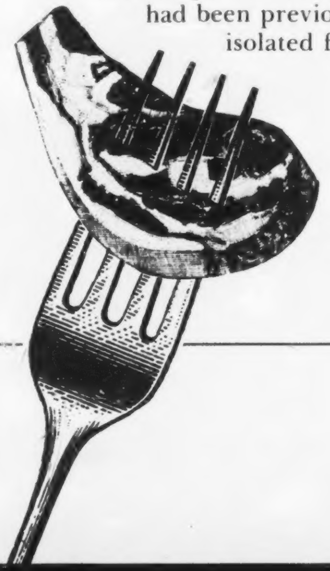
The powerful mutagen had been isolated from two sources, fried beef and beef extract—the essence of boiled beef.

Since a high proportion of carcinogens were already known to be mutagens, but it yet remained to be established that a high proportion of mutagens were carcinogens, this intensive study of mutagens in the cooking process implied that at some point, these workers in genetics were going to run those potent mutagens through animal tests to see if they were carcinogens. One could tell that both geneticists and scientists studying the relationship of nutrition to cancer were holding their breaths. It is an educated guess that Rodricks was holding *his* breath, even as he was addressing his fellow scientists.

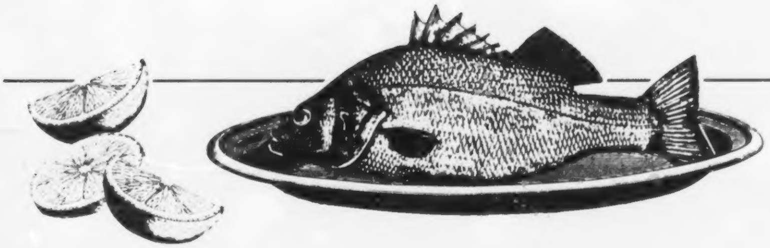
The next year, in 1981, two more papers appeared, which were part of this sequence of studies. One paper was written by a group of scientists at the Japanese cancer institute, including Takashi Sugimura. It was entitled "Structure of a Potent Mutagen Isolated from Fried Beef." And again, there was the dry, technical little summary:

"A new potent mutagen was isolated from fried beef beef. The molecular formula was determined as $C_{11}H_{11}N_5$ by exact mass measurement. The chemical structure of this mutagen was [etc. etc.]."

The paper informed readers that two potent mutagens had been previously isolated from broiled fish, and named them in chemical terms. One of those same mutagens had now been identified and isolated from "heated beef extract and fried beef, suggesting that it is present in a variety of cooked foods."



The second paper was a short article in *Science* entitled "Carcinogenicity in Mice of Mutagenic Compounds from a Tryptophan Pyrolyzate," written once again by a group of scientists from the Japanese cancer institute including the director, Sugimura, and the vice director, Takashi Kawachi. This paper reported on two mutagenic chemicals which had been found in broiled fish. One of those mutagens, said the authors, was more potent than aflatoxin B_1, which is to say that it was the most potent mutagen ever discovered. The authors reported that they had tested these chemicals in mice. At 200 parts per million, they said, they had caused liver cancers in the mice. The chemicals had not been poured into the mice in great amounts and they had not been operated on so that experimenters might implant the carcinogen directly into internal organs. The mice had simply eaten minute amounts of those chemicals in their food pellets. And, particularly important, only *one* control mouse got liver cancer. These were not ambigious findings. Although the intensely potent chemical is more mutagenic than aflatoxin B_1, said the authors, "its carcinogenicity is similar to that of 2-acetylaminofluorene"; it had matched with carcinogenicity, but less well with potency. Their conclusion



contained one short and memorable sentence:

"Thus, we report evidence of the carcinogenicity on oral administration of mutagenic compounds produced by cooking."

The first mutagens discovered in the cooking process had produced cancers.

By 1982, there were yet other discoveries. While the U.S. FDA was still refusing to inform Americans of natural carcinogens in foods, the Japanese cancer institute was reporting that 14 extremely potent mutagens—one of them the most potent known—had been identified in the cooking process itself, in broiling, frying, and boiling (at least the boiling which produces beef stock) and that six out of the seven already tested had produced liver cancers in mice.

Such data are neither more nor less significant than the data used in regulating industry. No one, including their Japanese discoverers, can say in advance what those chemicals are doing (if anything) to man, because no one can say in advance what any chemical is doing (if anything) to man. Nonetheless, as Rodricks said, the double standard is "simplistic." A chemical which produces cancers in laboratory animals is a chemical which produces cancers in laboratory animals, and if one molecule of such a chemical or one "exposure" to such a chemical must be assumed to be a cause of human cancer, then one must assume that cooking is a cause of human cancer. Unless the FDA plans to break off relations with Japan, or to hide all natural carcinogens in a vault, at some point these interesting data will become known to the public.

And they will be. One day, a critical mass of literate Americans will wake up to discover "chemical" demons dancing in their "natural" Garden of Eden. Of the demons that could most alarm a population trained to tremble at a single carcinogenic molecule, those in the natural food supply and those produced by the most common forms of cooking will be the most frightening. Food is of enormous symbolic significance in every culture; it is the crucial necessity for life known to all. A portion of the public will discount such findings as yet another cry of wolf. But those who have taken "regulatory" science most seriously will be afraid. As Rodricks predicts, they will raise questions about how cancer risk is assessed, and they will discover the unprovable one-molecule theory. And when they do, their skepticism, as Rodricks fears, *may* rise to "unmanageable proportions."

As Rodricks also predicts, questions will be raised on another issue as well, the hypocritical double standard for industry and for nature. The public will discover that the story that cancer was invented in post-World War II test tubes is false. The public will learn that it has been taught myths about the planet. The public will discover that the cancer "preventers" have been brandishing industrial perils at them while declining to inform them of the natural. The public will realize that by virtue of this selective process, it has been systematically pitted against its own economic system. The public will discover why. As political scientist Aaron Wildavsky has put it: "The richest, longest lived, best protected, most resourceful civilization, with the highest degree of insight into its own technology, is on its way to becoming the most frightened."

But the public will not be frightened forever. When a majority of literate Americans finally discovers that the country has been enmeshed for a generation in an ideological fairy tale—in a "big cancer lie"—its response will not be fear. It will, rather, be the turn of the cancer preventers to tremble. That, in fact, is why some of the most discerning are already afraid of the public.

'IN BALANCED COMBINATION'

Georgetown University provides a model for integrating new technologies to cut fuel consumption and meet energy needs.

By Doris Newcomb

Doris Newcomb is a Washington, D.C., writer specializing in energy issues.

In 1973, Georgetown University in Washington, D.C., faced the proverbial winter of its discontent—forced to halt classes and close its doors for a month when the energy crisis made fuel supplies temporarily unavailable. Numerous other colleges and universities across the country found themselves in a similar predicament, caught in the tight squeeze of fuel shortages and sharp increases in energy costs. Georgetown's response was unique—an ambitious energy plan to cut fuel consumption drastically and exploit new technologies to meet the university's energy needs. The results include significant savings in heating costs and in electricity consumption. Moreover, Georgetown has provided a model of initiative and ingenuity for meeting energy challenges both today and in the future.

Georgetown's original energy plan was designed to decrease oil and gas consumption, reduce overall energy use, and insure adquate energy supplies. On a larger scale, the university envisioned projects that would demonstrate how effective energy management programs, promising large-scale renewable technologies, and coal-based energy options could benefit other institutions.

The Georgetown energy program incorporates some of the most sophisticated, state-of-the-art energy technologies:

- A coal-fired atmospheric fluidized bed combustion plant can cogenerate thermal energy and electricity.
- A 300-kilowatt photovoltaic array can help shave peak electricity demand.
- Studies underway will determine the feasibility of using a fuel cell in combination with a coal gasifier to cogenerate heat and electricity.
- Even more comprehensive plans are being formulated to use emerging technologies to meet a variety of present and future needs, including transportation, between now and the year 2000.

Georgetown's program, the National Exemplar Integrated Socioenergy Systems (NEISES) master energy plan, reflects the philosophy that new energy systems are most effective when used in combination with traditional systems. Many creative energy systems developed in recent years have not proved commercially cost-effective. However, Georgetown maintains that "in balanced combination with other new or traditional energy systems, new technologies have the potential to be highly efficient and commercially feasible." By demonstrating the success of its energy system, Georgetown hopes to help speed up the commercialization and use of new technologies in general.

Energy Conservation

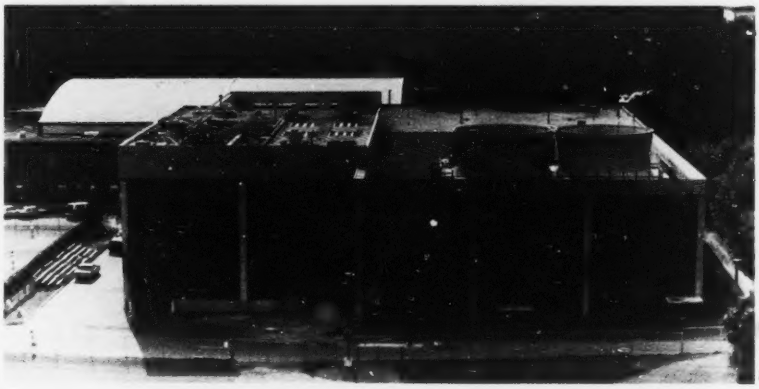
Georgetown launched its energy plan by implementing various energy conservation measures. Storm windows were installed, and fluorescent lights replaced incandescent ones. Restoration of older buildings on the 195-year-old campus emphasized improved methods for using energy, and new building designs maximized energy efficiency. For example, about 150,000 square feet of a large sports complex, completed in 1979, are underground. This solar building feature takes advantage of the relatively stable earth temperatures to reduce heating and cooling needs.

A central computer system,

Charles Feil

Georgetown's Intercultural Center with 300-kilowatt photovoltaic rooftop array.

During periods of peak demand, the computer sheds load automatically . . .


Exterior of $14 million atmospheric fluidized bed combustion and boiler facility.

Charles Feil

programmed to manage automatically the campus' heating and cooling energy load, plays a major role in energy conservation. To lower electricity consumption, the computer automatically cycles on and off electricity-consuming units such as large fans. During periods of peak demand, the computer sheds load automatically by temporarily shutting down nonessential electrical units.

The computer also regulates heating and cooling supplies in various ways. It resets supply air temperatures as low or high as possible, based on the requirements of the building area with the greatest demand. The computer also calculates precisely when heating and cooling supply systems need to begin operating during the night to produce adequate indoor temperatures by morning in offices and classrooms.

In summer, the computer controls whether air conditioning units use outdoor or indoor air for cooling. Such determinations are based on the relative heat content between outdoor and indoor temperatures and on humidity levels. Chillers serving specific buildings can be set remotely at the highest possible temperature depending on the outside temperature. In addition, the computer controls the speed of chilled water pumps at the central heating and cooling plant so that they pump only the chilled water required to meet cooling needs and maintain differential pressure.

Fluidized Bed Combustion

Georgetown began planning in 1974 for its first "national exemplar" or model facility—a $14 million atmospheric fluidized bed combustion plant. Funding assistance from the Department of Energy helped finance feasibility studies and plant construction. Located on the southwestern portion of the 100-acre campus, in proximity to two existing boilers, the plant ties into the existing steam distribution system. When constructed, this facility was the first of its kind in the United States.

The demonstration plant went into operation in 1979, and it has served successfully as the university's main steam source for heating and cooling all four million square feet of building space.

The plant operates in much the same manner as similar plants, burning coal in a fluidized bed (a mass of limestone suspended in air) to produce steam. However, it is significant to note that this plant burns high-sulfur coal in a city with strict air quality regulations. Two pollutants commonly associated with coal burning are sulfur dioxide and nitrogen oxide. In a fluidized bed combustion system, sulfur dioxide reacts with the limestone to form calcium sulfate, a solid waste easily disposed of in landfills. The coal also burns at a temperature lower than that required by the traditional coal-burning process; this decrease in temperature inhibits the formation of nitrogen oxide.

Costs have dropped substantially since the fluidized bed combustion plant began operating.

Since the plant went into operation, emissions have remained well within District of Columbia and Environmental Protection Agency standards. According to University Architect Dean Price, "this plant has demonstrated that a fluidized bed combustion system can meet a large institution's requirements economically and reliably without polluting the atmosphere."

Costs have dropped substantially since the fluidized bed combustion plant began operating. Two oil- and gas-fired boilers that previously met university needs now operate only as backup units. Because they cost roughly twice as much to operate as the new plant, savings have been dramatic.

Cogeneration

This summer, work was finished on a 2,880 kilowatt turbine generator that completes Georgetown's fluidized bed combustion plant. With the new generator the university can meet a portion of its own electricity needs through cogeneration.

The high-speed turbine generator is a "back pressure" unit, one that uses steam in sequence, first to produce electricity and then to meet thermal requirements. The amount of electricity it can produce varies depending on how much steam is needed for heating and cooling. If a full boiler output of 100,000 lb./hr. is required, the plant can generate the maximum amount of electricity. As steam production decreases, electricity generation decreases proportionally.

To produce electricity as well as steam, the plant must produce steam at a higher pressure. Before the turbine generator was added, the plant produced steam at a pressure of 275 lbs. per square inch. With the turbine generator in operation, steam is produced at 625 lbs. per square inch and passed through the turbine. The steam then leaves the turbine at 275 lbs. per square inch, the pressure required to run chiller compressors in warm weather. In winter, the steam pressure will be reduced further to the level required for the campus steam distribution system.

The turbine generator promises to be both reliable and economic. Price notes, "Since it costs very little in additional fuel to produce higher steam, the additional costs to produce electricity are small."

Electricity not needed by the university will be sold to the Potomac Electric Power Company (Pepco), whose service area includes the Georgetown campus. The university's facility is the first cogenerator of significant size on the Pepco system, which is located in a non-industrial area. The utility has worked closely with Georgetown throughout the planning process, providing technical assistance to the cogeneration planning effort, ensuring that the plant interconnection with Pepco's grid meets safety standards, and negotiating rates for purchased electricity. In all, five areas of the company have served the cogeneration project: Substations, Commercial Energy Services, Customer Engineering, Rates and Economic Analysis, and System Planning.

Pepco Senior Vice President Paul Dragoumis contacted Georgetown and offered Pepco's assistance when he first heard about the University's plan to generate electricity. He

Charles Feil

The University's 150,000 square feet sports complex takes advantage of the relatively stable earth temperatures to reduce heating and cooling needs.

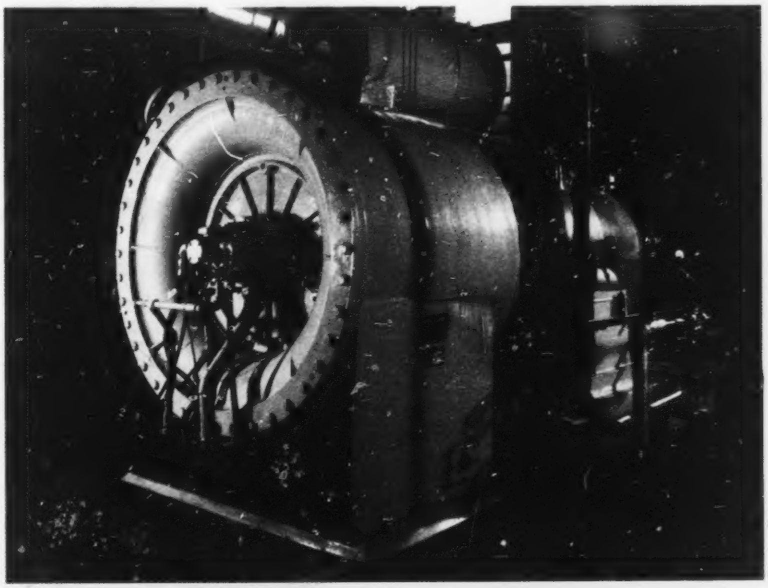
. . . this plant burns high sulfur coal in a city with strict air quality regulations.

Chiller compressor, above, and backup oil- or gas-fired boiler, below.

subsequently served on a university advisory council for three and a half years. According to Dragoumis, the cogeneration plant is consistent with the company's corporate strategy and with the aims of customers and shareholders. "Everything we're doing at Pepco is aimed at one of three strategies: maximize coal burn, avoid building new facilities as long as possible by shaping load growth, and aggressively market electricity for off-peak use." Dragoumis adds, "We'd like to see more than 100 megawatts of cogenerating facilities in our service area to help meet future demand and to defer the need for our customers to bear the cost of new facilities."

Georgetown sees further potential for utilities and other business interests to participate in cogeneration ventures through joint ownership and/or operation. The Public Utility Regulatory Practices Act requires electric utilities to purchase electricity that cogenerators choose to sell. It also allows utilities to own up to 50 percent of a cogenerator without being subject to regulation in its operation. (Rates charged consumers for electricity produced by cogeneration are regulated.)

In 1981, with a grant from the John A. Hartford Foundation, Georgetown examined potential methods for implementing ownership and operating business arrangements for the cogenerator. Among the possibilities—the cogenerator could be owned and operated jointly by the university and Pepco, owned by the university and the utility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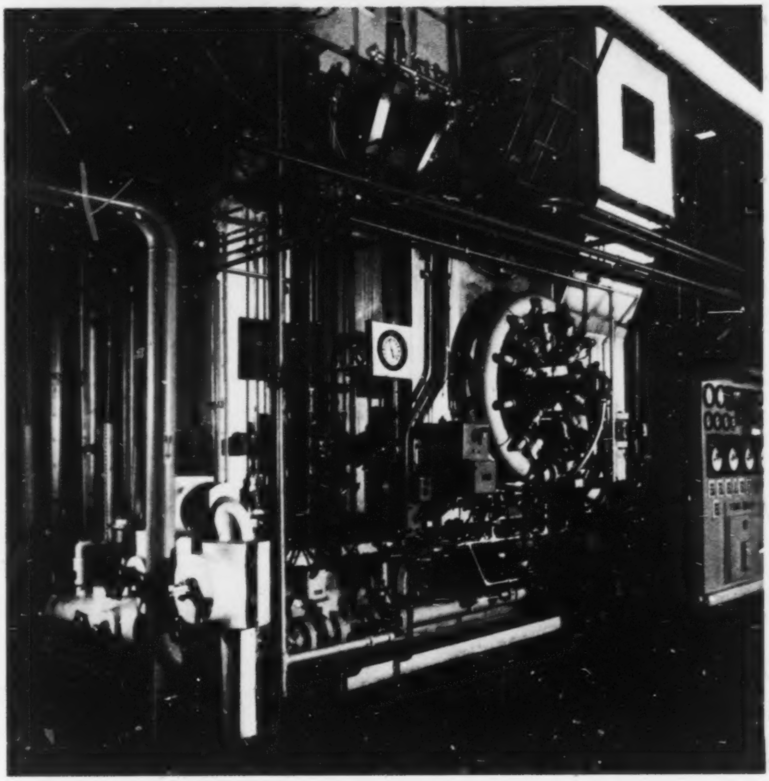

Charles Feil

and operated by the utility, or owned by a third party and operated by the third party and the utility. Price says such arrangements would allow utilities to invest in smaller capacity units, thus deferring large additions, reducing the lead time required for expansion, and allowing utilities to achieve the most cost-effective match between supply and demand.

Reducing Peak Load

The second of Georgetown's "national exemplars" has just been completed on the university campus—a 300-kilowatt photovoltaic array on the roof of the university's Intercultural Center. The Center itself houses the School of Foreign Service, as well as numerous other university divisions, classrooms and offices, an exhibit area, and a 400-seat lecture hall. Georgetown expects the photovoltaic project to demonstrate that other large buildings could benefit from similar installations.

The photovoltaic array is one of the largest in the world, covering 36,000 square feet with 4,464 photovoltaic modules. It should meet about 40 percent of the building's peak electricity load under normal sun radiance. Construction costs for the Photovoltaic Higher Education National Exemplar Facility totalled $24 million, with $10 million provided by a federal grant and the rest by the university.

The Intercultural Center, completed in 1982, was actually designed so that photovoltaic modules could be added later.

The photovoltaic array is one of the largest in the world.

Charles Feil

Structural elements maximize the modules' effectiveness. The building's rooftop, for example, was designed with an elevation of about 35 degrees, allowing the modules—placed at the same angle—to make maximum use of the sun's rays.

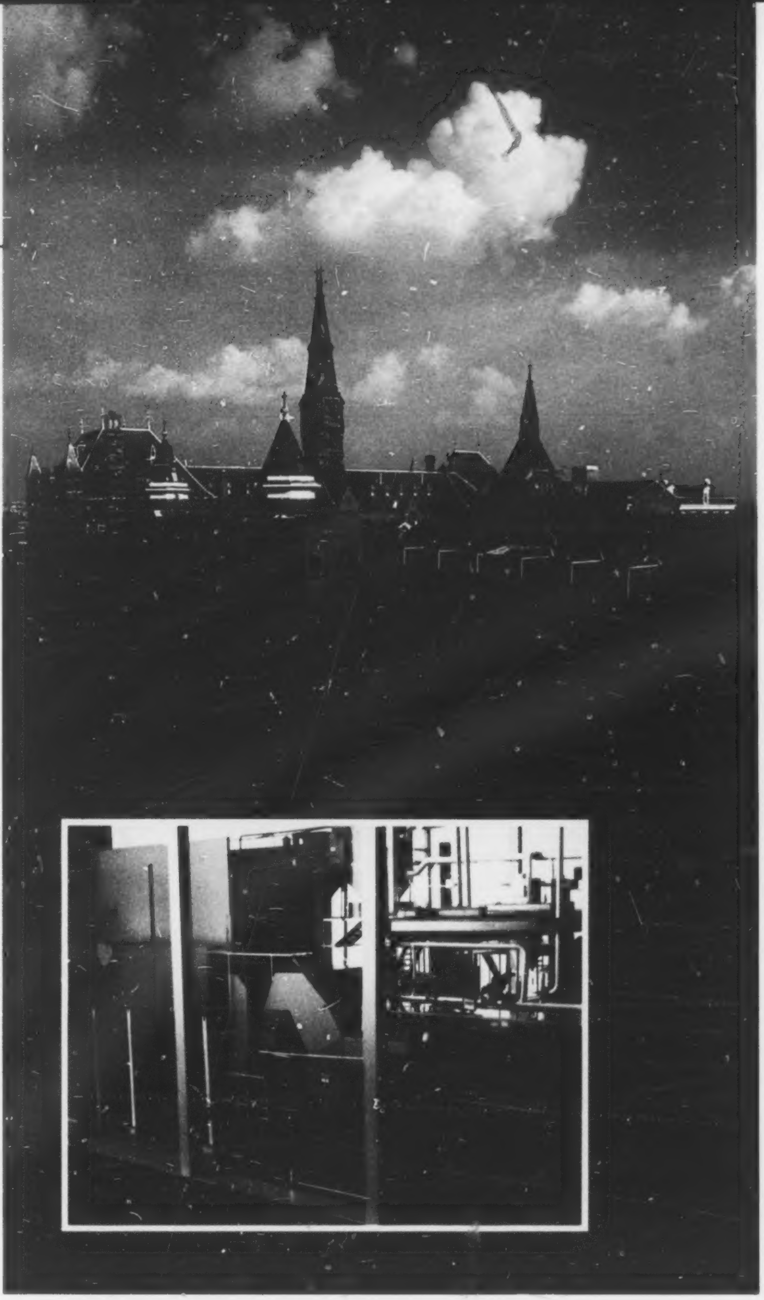
Unlike the typical rooftop photovoltaic installation, Georgetown's is an integral part of the building's structure. The flat, rectangular modules fit tightly together, forming a watertight roof for part of the building. The modules, when in place, have a varigated appearance and look like many roof surfaces; they can even be walked on. The Georgetown facility may be the only photovoltaic installation in the nation that can provide environmental protection as well as electricity, according to George Naff of Hughes Aircraft, the system installer.

The array is composed of semi- and poly-crystalline silicon cells; these cells have not yet achieved the degree of market penetration of single-crystal silicon cells. According to Naff, the poly-crystalline cells, manufactured by Solarex, are slightly less efficient than single cells, but less expensive to produce.

The photovoltaic modules use sunlight to produce direct current electricity; this electricity is converted to alternating current and sent directly into the Intercultural Center's electric power system. Although the array generally will produce less electricity than the building requires, it may produce excess electricity at times of low demand, such as weekends and holidays. Since the building's electrical system is tied into the university's system, excess electricity can go to other buildings where needed.

Most importantly, the buildings system reduces the university's need to purchase electricity during peak periods. Georgetown pays rates based on time-of-use, and these rates are highest during mid-day periods of peak demand when the photovoltaic array's output is greatest.

Georgetown has begun construction on yet another installation to reduce peak electricity demand—a two-million-gallon Cryo-Aquatic Reservoir. The reservoir system (essentially a large tank to be built underneath a 1,000-car garage on campus) employs an advanced design that cools water at night for use the following day. Between midnight and 8 a.m., when the university pays off-peak rates for electricity, electric chillers will cool the water. During daytime hours, the chilled water will circulate to provide air conditioning and then return to the reservoir for rechilling the following night.



Georgetown campus skyline and fluidized bed combustion plant model, inset.

Charles Feil

Built with a $3.2 million loan from the U.S. Department of Education, the system will provide economical air conditioning for university dormitories. It is scheduled for completion by fall 1985.

Future Plans

The next phase of Georgetown's energy plan will advance a coal gasification/cogeneration/fuel-cell program. Georgetown has received an $820,000 contract from the Department of the Army and DOE to study the feasibility of using fuel cells in conjunction with coal gasifiers at the university and at three Army sites around the country. At each site, hydrogen gas produced from coal would fuel the cells, which in turn would provide heat and electricity. The university believes that such installations could produce energy efficiently and provide additional opportunities to use coal as a fuel source. Both goals are in line with national energy policies.

Planning for Georgetown's coal gasification/cogeneration/fuel-cell project began a few years ago. Examining the various alternative energy source possibilities, university planners concluded that fuel cells had a good chance of reaching the commercial market. Commercialization could be achieved more quickly, they believed, if coal were used in cogenerating fuel-cell systems.

Federal installations are formulating new energy plans based on a Congressional directive to convert their heating and cooling plants from oil and gas to coal. The Army estimated conversion costs for the first 15 sites at more than $750 million.

In its feasibility study, Georgetown will examine the possibility of installing coal gasifiers and fuel cells at Army sites in Alaska, Pennsylvania, and Texas, as well as on its own campus. Site-specific analyses will be required for all locations before commercially available coal-gasifier systems could be constructed to provide gas for fuel cells. Each fuel cell would have a capacity of 7.5 or 11 megawatts, depending on the manufacturer, and the energy system would provide hot water, steam, and electricity according to the needs of the community at the site. In some cases, excess thermal heat might be available for use in surround-

. . . Georgetown expects to tie all university energy systems together into one integrated system.

ing communities.

The federal government will review the feasibility study and examine the cost effectiveness of the projects. If it decides to proceed, the next two steps would be to conduct engineering and technical planning and then to construct the cogeneration installations. If all the plants prove economically feasible, construction costs would total $160 million in federal research demonstration funds and up to $60 million in private investment. Georgetown believes the study will prove that such plants could actually save taxpayers money. "While the federal government would provide much of the funding for the first four projects, institutional and private investors could be attracted to additional installations if the original ones prove successful," Price predicts. "Thus, such plants ultimately might be owned and operated completely by the private sector."

According to Price, future plants of this kind could supply the Army with electricity and thermal energy at a much lower cost than its gas- and oil-fired units. In the projected Georgetown scenario, the first set of installations would be financed 70 percent by the government and 30 percent by the private sector; the second set, 50 percent by government, 50 per cent privately, and the third set completely by private interests with no cost to the federal government. For several hundred additional federal installation facility conversions, federal dollars could be eliminated by third party cogenerators from the private sector.

Socioenergy Podiums

The university's master plan for development designates three areas on campus as future "socioenergy podiums." These will be large structures incorporating on various levels energy facilities, classrooms, offices, recreational and parking facilities, and residences. Price notes that, because of its location in a historic district, the university has limited space for expansion and must build structures that meet a variety of needs in one multilevel unit. "We use the term *socioenergy* because it ties all these multiple functions together," he explains.

Although socioenergy podiums are still largely in the planning stage, design and construction have begun at the first of three podium sites. The upper level of the podium would house a University Center, providing facilities for social, cultural, and extracurricular activities, as well as garden spaces and trees. Lower levels would incorporate a parking garage and new energy systems, including a giant heat pump with a multimegawatt capacity. The other two socioenergy podiums will include a variety of educational support facilities, office space, and a transportation center. As new transportation systems are developed and the need for automobile parking diminishes, parking levels in various podium structures will be eliminated, making room for additional educational and support facilities. Parking levels will be designed for easy conversion at a later date.

Energy systems in the podiums will incorporate a variety of technologies from heat pumps and thermal storage systems to coal-gasifier/fuel cell installations. Price believes the gasifiers could supply three gas streams: methane gas possibly to operate fuel-cell buses, industrial heating gas to replace oil and natural gas in auxiliary boilers, and synthetic gas for fuel cells. In turn, the fuel cells would provide additional thermal energy and electricity that could be used to meet campus and community needs. For example, electricity might be used to recharge electric battery hybrid/fuel-cell buses.

Eventually Georgetown expects to tie all university energy systems together into one integrated system, further increasing the efficient use of energy supplies. If the university system produces excess energy, the NEISES system could even be connected to the local utility grid. The District of Columbia already is considering Georgetown as a potential supplier for sectorial hot water systems.

For almost 200 years, Georgetown University has prepared students to meet the demands and challenges before them. The university's commitment to energy efficiency reflects this heritage, and its energy program provides an encouraging model of what effective energy management and a resourceful use of new technologies can mean for the future.

WHO GETS THAT DAM LICENSE?

Legislation in Congress and recent or pending judicial decisions reflect intensifying competition for the nation's hydroelectric resources.

By Peter Kelsey

Peter Kelsey is Assistant General Counsel for Edison Electric Institute. The views expressed in this article are those of the author and do not necessarily represent those of the Edison Electric Institute.

With an invaluable energy source at stake, the preference issue for hydroelectric relicensing is now a center of debate in Congress and the courts. Proposed legislation, as well as recent or pending judicial decisions concerning relicensing and other preferences, reflect intensifying competition for and questions about the allocation of hydroelectric resources to the public. For instance, for projects on federal lands, one economist suggests a bidding system for the hydroelectric resource. Because of the comparatively low cost of hydroelectric power, ultimate resolution of this debate will affect consumers throughout the country.

The relicensing preference controversy arose in 1980. The Federal Energy Regulatory Commission (FERC) then for the first time determined that states and municipalities can take over licenses for existing hydroelectric projects at the time of relicensing if their plans for continued operation are merely as good as, though no better than, the existing license holders'. In short, under that interpretation, state and municipal utilities would be *preferred* at the time of relicensing over an existing, non-government operator of the project. This interpretation contrasted with 1957 and 1967 interpretations by the Federal Power Commission and FERC. But in 1983, FERC reversed the 1980 interpretation in the context of the *Merwin* case, the first relicensing competition to reach the Commission for decision.

FERC based its conflicting decisions on interpretations of the 1920 Federal Water Power Act, which became the Federal Power Act (FPA) in 1935. All agree that this legislation granted states and municipalities a preference over private utilities in obtaining the initial license to own and operate hydroelectric plants. When the legislation was enacted in 1920, electricity could be transmitted only over short distances, and Congress wanted to be sure that municipalities would not be precluded from access to hydroelectricity for municipal uses such as street lighting and streetcars. But at that time no one envisioned the dramatic changes in technology, fuel costs, and electric utility regulation that have shaped electricity demand and energy costs in recent decades and prompted questions concerning the merits of a preference policy today.

Congress recessed this past August having reached no resolution to the hydroelectric relicensing dispute—an issue of major importance to investor-owned utilities. And it is unlikely that Congress will resolve the issue in the balance of this session. However, issues that arose this year, particularly in the context of the Shelby (H.R. 4402) and Ottinger (H.R. 5299) bills, undoubtedly will resurface during debate on hydroelectric relicensing during the 99th Congress in 1985. An analysis of this legislation reveals a great deal about the preference controversy and what may be necessary to resolve it.

H.R. 4402 The Shelby Bill

Introduced by Representative Richard C. Shelby (D-AL) and 44 original co-sponsors in November 1983, the Electric Consumers Protection Act (H.R. 4402) does not affect the preference for preliminary permits and original licenses, but it does make clear that a municipal preference does not apply at re-

Ultimate resolution of the hydro debate will affect consumers throughout the country.

The current compensation standard covers only net investment plus severance damages . . .

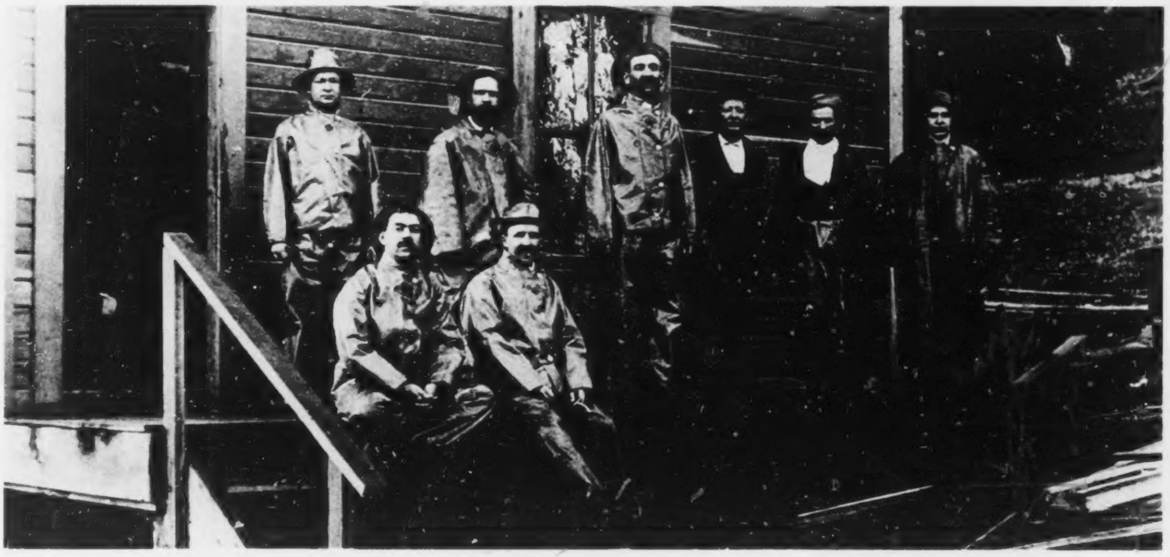
licensing. The bill explicitly identifies Section 10(a) of the FPA as the basic standard for judging the merits of competing applications for a new license at the time of relicensing. According to this standard, under the Shelby bill the existing licensee's application would have to be "best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water-power development, and for other beneficial public uses, including recreational purposes." If the application did not meet this test, the existing licensee would not receive a new license.

The Shelby bill also would change the current law regarding compensation for the existing licensee should a new license be issued to another applicant. The current compensation standard covers only net investment plus severance damages—with net investment interpreted to mean only the original cost of the plant 50 to 60 years ago depreciated over the life of the license. Just one example amply justifies the concern of the utilities and their customers that they will not receive adequate compensation for their hydroelectric projects if they are lost to municipal applicants. The administrative law judge in his initial decision in the *Merwin* case found that Pacific Power & Light Company (PP&L) had a net investment in the 136 megawatt project of only $9.4 million as of June 1982. Moreover, the judge found that the utility was due no severance damages. FERC staff, however, contended that future power costs from a replacement thermal plant would be $732 million.

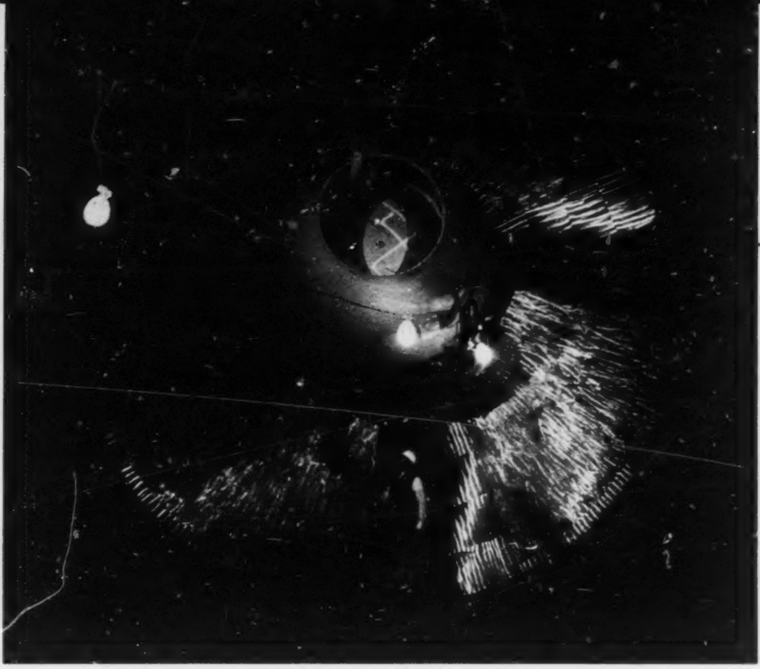
The Shelby bill would require the new licensee to pay "just compensation as determined by FERC in accordance with due process of law." Under this new value-related standard, the original licensee and its customers could hope to receive fair compensation for the value of the facility and the power it produces. For example, the new compensation standard could take into consideration replacement energy and capacity costs.

Since its introduction, the Shelby bill has attracted 118 cosponsors from across the country. They reflect the bill's broad political and ideological support throughout Congress: from Chip Pashayan (R-CA) to Henry Waxman (D-CA), Howard Neilson (R-UT) to Bob Carr (D-MI), and Trent Lott (R-MS) to Tony Coelho (D-CA). Recently, Claude Pepper (D-FL), persuasive advocate for elderly Americans, has joined as a cosponsor.

The investor-owned utility industry is one among a number



No one envisioned the dramatic changes in transmission technology, fuel costs, and electric utility regulation since the days of this early hydro crew.



of varied interest-groups who support the Shelby bill. Others include:

- American Association of Retired Persons (AARP)
- American Farm Bureau Federation
- National Association of Regulatory Utility Commissioners (NARUC)
- Commissions:
  - California Public Utilities Commission
  - State of Colorado—Public Utilities Commission
  - State of Michigan—Public Service Commission
  - State of Washington—Utilities and Transportation Commission
- Building and Construction Trades Department
- International Brotherhood of Electrical Workers (IBEW)
- Utility Workers Union of America
- Teamsters Local 572
- Business Roundtable
- U.S. Chamber of Commerce
- Electricity Consumers Resource Council
- American Petroleum Institute
- National Association of Counties
- National Association of Manufacturers
- American Paper Institute
- National Conference of State Legislatures
- Mayor, Salt Lake City, Utah
- Mayor, Charlotte, North Carolina
- California State Grange
- Association of California Water Agencies
- County Supervisors Association of California
- Mayor Pro Tem, Clovis, California

A large number of newspapers have also endorsed Shelby's bill, including editorials in the *New York Times*, the *Sacramento Bee*, the *Pomona Progress Bulletin*, and the *Kansas City Star.*

A basic issue of fairness has convinced these and other parties that a municipal preference should not be used to take away existing projects at the time of relicensing. Many are asking how public policy can use the ownership status of a competing municipal utility to justify taking away a fuel-free hydroelectric project from millions of customers who have paid for it through their rates over the years.

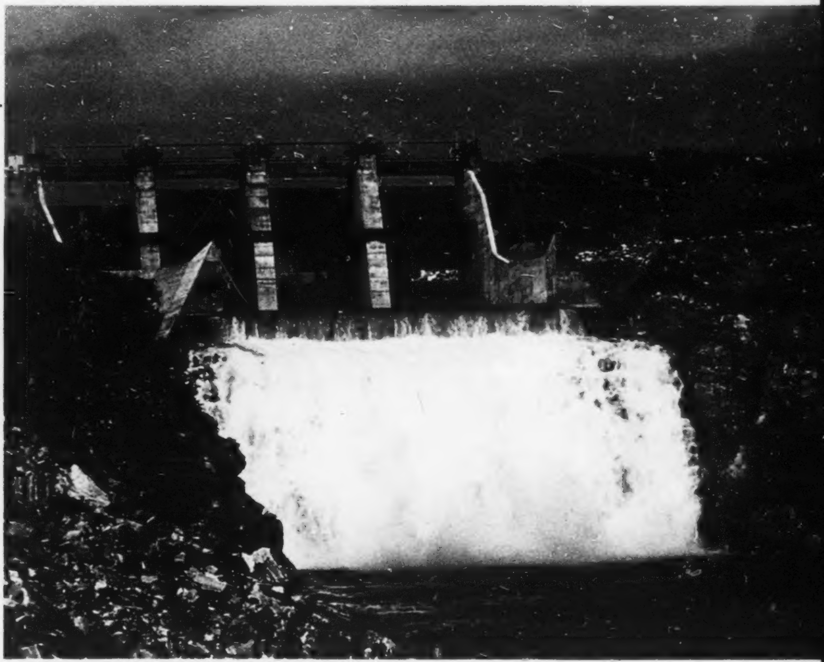
A municipal preference should not be used to take away existing projects at the time of relicensing.

Of course, public power advocates for a municipal preference at relicensing have received some support for their position as well. The main source of that support has come from the Consumer Energy Council of America, an organization chaired by Alex Radin, Executive Director of the American Public Power Association.

H.R. 5299 The Ottinger Bill

Representative Richard Ottinger (D-NY) has been chairman of the Subcommittee on Energy Conservation and Power of the House Committee on Energy and Commerce during the 98th Congress. He characterizes a bill he introduced as reaffirming that a preference for public agencies does exist. Although acknowledging that under his bill preference is largely symbolic, he believes it offers some encouragement for public power entities to compete for hydroelectric projects, knowing that they need have a plan only as good as that of an existing licensee. According to Ottinger, the Shelby bill discourages competition by creating a rebuttal presumption in favor of an existing licensee—i.e., the Commission would have to find that the original licensee's plan did not satisfy some of the section 10(a) criteria before issuing a license to another applicant.

The Ottinger bill, rather than relying on the existing 10(a) standard, would establish a more general standard for the issuance of a new license. The li-



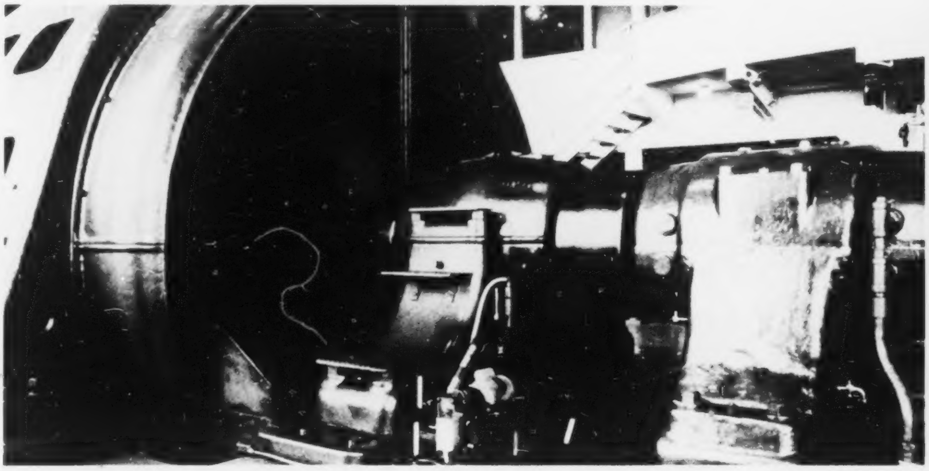
The license would go to the applicant whose plans are "best adapted to serve the public interest."

cense would go to the applicant whose plans are "best adapted to serve the public interests." However, the Ottinger bill enumerates three specific factors for FERC to consider in applying this standard.

The first factor concerns environmental impacts related to hydroelectric plants, including familiar environmental concerns about protecting water resources and mitigating impacts to aquatic systems. However, the proposal goes a step further and includes an obligation to "enhance" the environmental values of a water resource, without calling for a balancing of enhancement with costs, power production, or other related considerations. With such environmental language, Ottinger attracted the support of environmental organizations. In fact, environmental organizations assisted in drafting the proposal. However, the proposal in effect would do little more than reflect requirements already in FERC regulations. But it would place a seemingly unrestricted statutory burden on the existing or new licensee to improve the environmental values present in the project area at the time of relicensing. And the environmental emphasis would underscore FERC's National Environmental Policy Act responsibilities. (See the Regulatory Review column in this issue of *Electric Perspectives* for a related discussion resulting from the Ninth Circuit Court's decision in the *Yakima* case.)

The second criterion in Ottinger's bill would direct FERC to consider economic impacts of issuing a license to each applicant. For electric utilities, such impacts include the effects on ratepayers if a utility were not to receive the new license. This section of the bill would make explicit the criterion applied by FERC in the *Merwin* decision, the authority for which is currently being challenged by the municipal applicants in court. As defined by the Ottinger bill, economic impacts would also include "the impact on economic efficiency." Economic efficiency arguments are an important aspect of the relicensing preference controversy. For some utilities, the hydro component would reduce electric rates below marginal cost far less than for others whose electric rates would be based entirely or largely on hydroelectricity, as is the case for many municipal utilities. The large discrepancy between true marginal cost of electricity and the electric rates charged by a municipality would be economically inefficient, could promote wasteful use of energy, and create essentially artificial demand for construction of new generation sources. (See Jaskow and Schmalensee, "Economic Efficiency Criteria For Evaluating Adversary Hydro Relicensing Applications," National Economic Research Associates, Inc., July 1984.)

The third criterion in the Ot-



tinger bill, electric consumption efficiency programs contains no guidance to the Commission in terms of comparing the relative performance or plans of competing applicants. Whether this criterion would be advantageous to existing investor-owned licensees would require a case-by-case comparison between the conservation programs of the existing licensee and municipal competitors. But utility conservation programs are run at the state level. Ottinger's proposal would constitute significant federal intrusion into those programs, and where some state commissions have not been receptive to such programs, the proposal could be a significant handicap for the regulated investor-owned utility in contrast to an unregulated municipal utility.

The Ottinger bill retains the net investment standard as the floor for compensation to an existing licensee if a license is awarded to another applicant. However, if the original license holder were an electric utility, a competitor could stipulate to pay compensation in excess of the net investment. The Commission would consider this additional compensation in determining the economic impact on the ratepayers of the existing licensee and the successful applicant for a new license.

The Ottinger bill gives competing municipalities a distinct advantage, in addition to the preference, when competing for an investor-owned utilities project. If the compensation the municipal utility paid was less than just compensation, it could easily afford deluxe fish and wildlife enhancement measures and conservation plans in its application that might not be justifiable on a cost-benefit basis. Regulated investor-owned licensees, on the other hand, would have to be more conscious of the cost and benefit comparisons in what they propose.

Other Legislation

Proposed legislation introduced by Representative Albert Gore (D-TN) states that preference under the FPA as it applies in initial licensing should be extended to include electric cooperatives. And he interprets the present law to say the same preference applies at relicensing. Though this bill (H.R. 5416) received little attention this year, it is unique in calling for an elaborate antitrust review as a condition for relicensing. Lifted directly from the Atomic Energy Act where it applies to nuclear plant licensing, in the context of hydro relicensing the protracted antitrust review procedures were out of place. Whether or not this approach will resurface again in the 99th Congress is problematic.

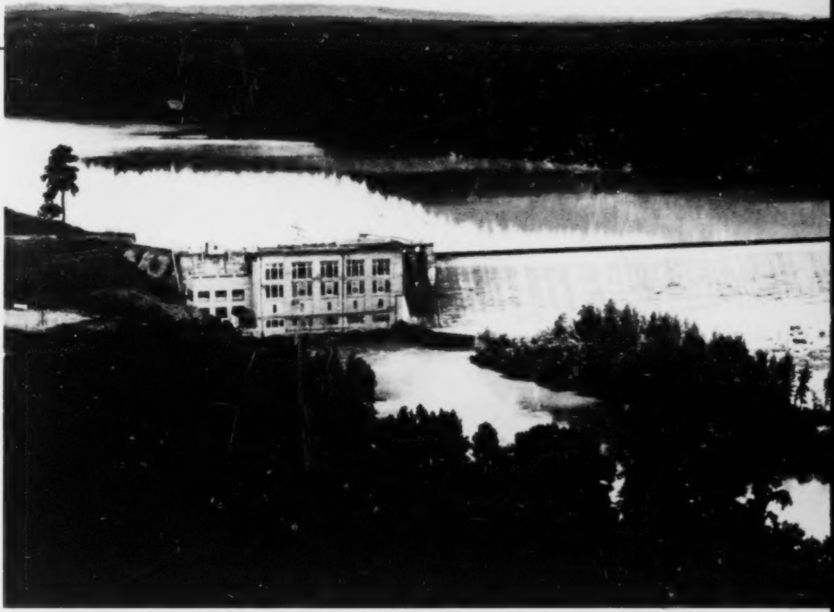
The Ottinger bill gives competing municipalities a distinct advantage.

Prompted by the interest and support in the House for making clear that municipal preference does not apply at relicensing, two senators introduced legislation to that effect. Senator Malcolm Wallop (R-WY) and nine other senators introduced S. 2710, a companion bill to H.R. 4402 (the Shelby bill). Senators Bradley (D-NJ), Proxmire (D-WI), and Murkowski (R-AK) subsequently have become cosponsors. Senator J. Bennett Johnston (D-LA) introduced S. 2711—a bill that would create a rebuttable presumption in favor of the existing licensee. Under the Johnston bill, the existing licensee would receive the new license unless the Commission determined that another applicant had a plan *better* adapted to serve the public interest. In contrast to the Shelby and Wallop bills, Senator Johnston did not address compensation in his bill but he indicated he had an open mind on the subject.

House Hearings

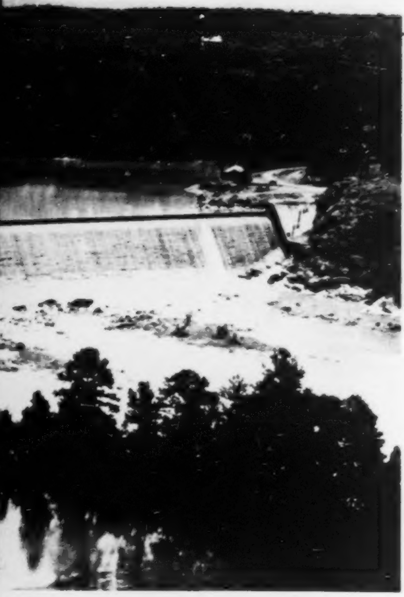
With the public's interest aroused and broad support arising in the House for H.R. 4402, Ottinger agreed to a hearing on the three House bills which was held on May 17, 1984. Representatives Shelby, Charles Pashayan, Jr. (R-CA), Tom Bevill (D-AL), Victor H. Fazio, Jr. (D-CA), and Anthony Coelho (D-CA) presented testimony in support of H.R. 4402. For the administration, Assistant Secretary Jan Mares of the Department of Energy and Commissioner A. G. Sousa from FERC advocated its enactment. In addition to these and the panel of investor-owned electric utility company witnesses, eight other witnesses testified in support of the Shelby bill. A comprehensive statement containing arguments and data was filed on behalf of the investor-owned electric utility industry by the Edison Electric Institute.

Given a subcommittee setting that typically has been a difficult one for private utilities, most observers opposing preference at relicensing felt their position had been presented persuasively at the hearings. Nonetheless, Chairman Ottinger made his position clear: a bill would not emerge from his Subcommittee unless an accommodation could be reached between his position, as reflected in H.R. 5299, and that of Representative Shelby. Following the hearings, the question became: could it be done with one side intent upon making clear that no preference applied at the time of relicensing while the other side insisted on a preference.



Negotiations during June and July failed to result in an accommodation between the two sides. Whether or not preference should apply at relicensing and the level of compensation to be paid by a successful competitor proved insurmountable issues. With Ottinger's retirement this year, it is unclear what other major issues will arise in the 99th Congress, but these two will clearly be among the prominent ones. It is likely also that any bill that emerges from the Energy and Commerce Committee will contain specific fish and wildlife protection provisions.

Although most of the action and publicity so far this year has focused on congressional deliberations, the relicensing preference issue also is pending before the United States Court of Appeals for the District of Columbia in the so-called *Merwin* case, *Clark-Cowlitz Joint Operating Agency v. FERC*. That case challenges FERC's award of a new license for the Merwin project to the existing licensee, Pacific Power & Light (PP&L), after a comparison on the merits with the competing municipal applicant. FERC's decision overturning its 1980 Bountiful opinion, by ruling that a municipal preference did not apply against an existing licensee at the time of relicensing, is also being challenged. The case was filed following FERC's issuance of Opinion 191 in October, 1983, has been briefed by all parties including intervenor Edison Electric Institute, and is scheduled for oral argument on October 18, 1984. The court could issue a decision before the end of the year, though whatever the outcome, the losing side probably will seek a Supreme Court review.



Other Preference-Related Developments

In May, Representative Barbara Boxer (D-CA) introduced a surprising amendment on the House floor, calling for power from Hoover Dam to be auctioned off to the highest bidder. The so-called "Boxer Rebellion" was significant both in its intent and because it received a surprising amount of support with little foundation having been laid. The proposal was defeated by only 20 votes.

Boxer's proposal focused attention on whether the low price of federally marketed hydro power, enjoyed mainly by municipal and cooperative utilities, is sound public policy. Municipal and cooperative utilities have a preference in purchasing power from Hoover Dam. Similar "marketing preferences" are found in many other federal laws. Preferential access to the low-cost, fuel-free hydro power, priced far below the marginal cost of electricity, has tremendous value, and a strengthening coalition of environmentalists and taxpayers oppose what they suggest is an economic anachronism. Environmentalists argue that such cheaply sold power stimulates wasteful energy use. Rather than conserving energy, it will increase demand for additional generating capacity. Taxpayers organizations also oppose the present policy, arguing that taxpayers are involuntarily subsidizing the sale of low-cost power from federal projects to small, select segments of the public who, by geographic happenstance, are customers of municipal or cooperative electric utilities.

Power marketing preferences have been the subject of attention in other forums as well. At the administrative level, on April 15, 1983, Utah Power & Light (UP&L) filed a response to the Western Area Power Administration's (WAPA) notice of proposed marketing criteria for a post-1989 marketing plan for hydroelectric power generated by the Colorado River Storage Project. The utility argues that its customers who reside in cities that would qualify as preference entities are as entitled to benefit from low-cost preference power from the Storage Project as are those consumers who by happenstance are served directly by municipal utilities. UP&L proposes that its residential customers either have an equal right to receive the benefits of the Project's preference power, or the preference provisions as interpreted by the Power Administration are unconstitutional.

On September 4, 1984, WAPA issued revised proposed marketing criteria. The revised criteria deny UP&L's request and that of the 143 cities, counties, and towns that applied through UP&L. WAPA has called for additional public comments on the revision. Whether UP&L will ultimately succeed in establishing this important precedent is unknown. If pursued all the way to the U.S. Supreme Court, the answer will not likely come until the latter part of the 1980s at the earliest.

The Supreme Court and U.S. Court of Appeals have turned back municipal preference related cases.

In cases arising on the west and east coasts, the Supreme Court and the U.S. Court of Appeals for the Second Circuit, respectively, have turned back municipal preference-related claims to hydroelectric power generated at federal and state hydroelectric projects. In *Aluminum Company of America v. Central Lincoln People's Utility District,* 104 S.Ct. 2472 (1984), the Supreme Court upheld the Bonneville Power Administrator's allocation of hydroelectric power in excess of firm power needs to industrial customers served directly by the Bonneville project. These allocations were challenged by preference utilities who argued, among other things, that the new contracts entered into with the industrial customers, under terms of the Pacific Power Northwest Electric Power Planning and Conservation Act of 1980, negated the preference accorded the public utilities under prior (1975) contracts and violated section 5(a) of the new law requiring power sales to be subject to a preference. The Court found that the preference provisions in the Bonneville Project Act of 1937, as incorporated into the Regional Act, did not apply to the initial contracts that the Regional Act required the Bonneville Power Administrator to offer to direct-service industrial customers.

In *Power Authority of the State of New York v. FERC* (2nd Circuit, August 15, 1984), the U.S. Court of Appeals for the Second Circuit afirmed a FERC order preserving through 1985 contracts between the New York Power Authority (PASNY) and private utilities against claims raised by municipal utilities. Under the Niagara Redevelopment Act, preference to half of the Niagara Project's power must go to public bodies and non-profit cooperatives, up to the level required to fill their "reasonably foreseeable needs." By 1978, when the municipalities wanted more power from the Niagara Project than had been allocated to them in 1960-61, PASNY said none was available from the Niagara Project. FERC would not order modification of private utility contracts allocating power earlier determined to be in excess of the preference utilities' needs, largely because the Power Authority had been able to make up the shortfall using other equally priced hydropower. The court ruled, however, that in the 1985-1989 period, if the Power Authority was unable to meet the preference customers' needs, existing contracts with private utilities could be modified to make more power available to the municipalities.

Conclusion

Although arising in different contexts and forums, all these preference-related controversies reveal a common motivation: private entities want to hold onto the relatively small portion of the valuable source of low-cost power they now have, while preference entities want to gain an even greater share of this resource. The preference principle, whether in the licensing of hydroelectric projects or in the marketing of power from federal and state projects, originated when the costs of electricity generated by hydro plants was aligned more closely to the costs of electricity generated from other sources. A comparison of production costs for 1970 and 1980 is enough to show that this is no longer the case, however. In 1970 the production costs for hydroelectricity (operation, maintenance, and fuel) were .56 mills per kilowatt-hour (kWh); those for steam-electric plants were 3.98 mills. By 1980 the comparable costs for steam-electric plants were more than 15 times those for hydroelectricity—23.54 mills compared to 1.52 mills.

What the court of appeals said in the context of the *Niagara* case is equally applicable in other preference contexts addressed in this article: "[W]hat no one foresaw (or could foresee) . . . was that the 1973 oil embargo, which drastically increased the price of fossil fuels, followed by double-digit inflation would suddenly make hydro power a prized commodity." In its filing with the Western Area Power Administration, UP&L pointed out that in 1981-82 Colorado River Storage Project power was marketed for less than 8 mills per kWh. Thermal-based power was costing in excess of 50 mills per kWh, and UP&L projected new thermal-based power as costing in excess of 70 mills per kWh. It should be no wonder, therefore, that the interest in and competition for hydroelectric power resources has intensified.

In the context of hydroelectric relicensing, Congress and the courts are facing a generic question: When a resource has become as comparatively valuable as hydroelectric power, should federal laws contain a preference that would concentrate hydroelectricity among the relatively few electric consumers who, by geographic happenstance, are served by a government run utility, or should the benefits be spread as broadly as possible to millions of consumers through authorized mechanisms to ensure fair and equitable competition for or access to this resource? The answer is crucial—not only to the investor-owned utilities, but even more so to the millions of customers whom they serve. EP

FINANCIAL REVIEW

EARNINGS PER SHARE INCREASE 23 PERCENT; TOTAL ASSETS HIT RECORD $353 BILLION, UP 10 PERCENT

The average share of electric utility common stock outstanding during the first quarter of 1984 earned $0.91 off of an 11.3 percent increase in kilowatt hour sales. This figure represents a 23.0 percent increase over earnings of $0.74 in the first quarter of 1983. Electric operating revenues increased 12.5 percent, while total electric operating expenses increased 11.1 percent, resulting in an 18.9 percent increase in electric operating income. Combined income from other utility and non-utility operations increased 38.7 percent, and allowance for funds used during construction (AFUDC) was 8.2 percent higher.

Electric utility operating revenues were $28.6 billion in the first quarter of 1984, 12.5 percent greater than the first quarter of 1983. Driving the revenue growth was an 11.3 percent increase in kilowatt hour sales to ultimate customers. This increase resulted primarily from continued economic improvement and weather which was, on the average, colder than the first quarter of 1983.

Operating Expenses

Electric operating expenses totalled $23.2 billion during the first three months of 1984, up 11.1 percent from the same period in 1983. Total operation and maintenance expenses (including fuel) increased 7.5 percent. While recording its greatest relative increase since the fourth quarter of 1981, fuel expense represented only 38.6 percent of total electric operating expenses, the lowest level since Edison Electric Institute (EEI) began tracking the figure on a quarterly basis in 1976. Total income tax expenses increased 39.2 percent during the first quarter of 1984 and 37.2 percent for the twelve months ending March 31, 1984, indicating an improved profitability of many companies in the industry. One year ago, during the first quarter of 1983, total income tax expenses increased only 6.7 percent.

During 1983, the provision for deferred taxes increased an estimated 184 percent over 1982. An EEI study of this increase determined that deferred income taxes arising from nuclear fuel disposal or storage costs, deferred fuel or energy costs, and the reversal of certain regulatory balancing accounts each created a greater increase in deferred income taxes for the industry as a whole than accelerated or liberalized deductions for depreciation.

Income from other utility and non-utility operations contributed $1.3 billion or $0.26 per share (about 29 percent) to earnings in the first quarter of 1984. This is an increase from $1.0 billion or $0.20 (27 percent) per share in the first quarter of 1983.

The impact of declining construction expenditures and plant cancellations have become evident in the decreasing rates of increase in total AFUDC and construction work in progress (CWIP). The rate of increase in total AFUDC continued to decline in the first quarter of 1984, increasing only 8.2 percent compared to a 19.4 percent increase in the first quarter of 1983. For the twelve months ending March 31, 1984, AFUDC increased 13.5 percent over the twelve months ending March 31, 1983, the lowest increase since the twelve months ending September 30, 1981. Over the same period, accumulated CWIP increased only 7.1 percent, to $101 billion.

Increased revenues, resulting in major part from higher sales of electricity and declining rates of increase in AFUDC, have improved the quality of the industry's earnings. In the first quarter of 1984, AFUDC accounted for 45.3 percent of income available for common stock, down from 54.6 percent one year earlier. For the twelve months ending March 31, 1984, AFUDC made up 52.4 percent of earnings, compared to 58.7 percent one year earlier.

Table 1

Investor-Owned Electric Utility Industry Statement of Income
For periods ending March 31, 1984 and 1983 (unaudited) (Millions of Dollars)

	Quarter Ending March 31,			Year Ending March 31,		
	1984	**1983**	**% Change**	**1984**	**1983**	**% Change**
Total Electric Operating Revenues	$28,618	$25,446	12.5	$111,572	$101,495	9.9
Electric Operating Expenses						
Fuel	$8,940	$8,476	5.5	$36,152	$35,350	2.3
Other Operation & Maintenance	7,092	6,434	10.2	27,256	25,250	7.9
Depreciation & Amortization	2,206	2,018	9.3	8,417	7,669	9.8
Taxes Other Than Income Taxes	2,137	1,926	11.0	8,032	7,272	10.5
Income Taxes (Federal & Other)	1,019	713	42.9	3,614	3,168	14.1
Provision for Deferred Income Taxes	1,016	619	64.1	4,898	2,268	116.0
Investment Tax Credit Adjustment, Net	751	670	12.1	1,923	2,169	(11.3)
Total Electric Operating Expenses	$23,161	$20,856	11.1	$90,292	$83,146	8.6
Electric Operating Income	$5,457	$4,590	18.9	$21,280	$18,349	16.0
Other Utility Operating Income	733	548	33.8	1,394	1,025	36.0
Total Utility Operating Income	$6,190	$5,138	20.5	$22,674	$19,374	17.0
Other Income	590	406	45.3	1,875	1,490	25.8
Allowance for Other Funds Used During Construction	1,274	1,168	9.1	5,138	4,308	19.3
Total Income Before Interest Charges	$8,054	$6,712	20.0	$29,687	$25,172	17.9
Interest Charges						
Interest on Long Term Debt	$3,286	$3,027	8.6	12,744	$11,766	8.3
Other Interest Expenses & Charges	275	242	13.6	1,146	1,355	(15.4)
Allowance for Borrowed Funds Used During Construction	(804)	(753)	6.8	(3,189)	(3,027)	5.4
Net Interest Expenses & Charges	$2,757	$2,516	9.6	$10,701	$10,094	6.0
Net Income Before Extraordinary Items	$5,297	$4,196	26.2	$18,986	$15,078	25.9
Extraordinary Items	18	1	NM	(258)	31	NM
Net Income	$5,315	$4,197	26.6	$18,728	$15,109	24.0
Preferred Dividends Declared	726	678	7.1	2,836	2,604	8.9
Net Income Available for Common	$4,589	$3,519	30.4	$15,892	$12,505	27.1
Common Dividends Declared	2,731	2,507	8.9	10,523	9,228	14.0
Retained Earnings	$1,858	$1,012	83.6	$5,369	$3,277	63.8
Earnings Per Share*	$0.91	$0.74	23.0	$3.24	$2.77	17.0
Common Dividends Per Share*	$0.54	$0.53	1.9	$2.14	$2.04	4.9

NOTE: The income statement is a "net" statement: the duplicative effect of including resale revenues has been eliminated.
*Based on average shares outstanding as reported to EEI by survey respondents and adjusted for stock splits.
(NM) Not Meaningful

Table 2

Investor-Owned Electric Utility Industry Balance Sheet As of March 31, 1983 and 1984 (unaudited) (Millions of Dollars)

Assets	1984	1983	% Change
Utility Plant*			
Utility Plant (Including Nuclear Fuel)	$280,912	$254,595	10.3
Less Accumulated Depreciation	79,784	70,346	13.4
Less Property-Related Accumulated Deferred Income Taxes	4,511	3,113	44.9
Total	$196,617	$181,136	8.5
Construction Work in Progress	101,450	94,688	7.1
Net Utility Plant	$298,067	$275,824	8.1
Investments	6,748	5,950	13.4
Current Assets	34,350	31,217	10.0
Deferred Debits	13,420	7,614	76.3
Total Assets	$352,585	$320,605	10.0
Capitalization & Liabilities			
Capitalization			
Common Stock	$75,732	$68,479	10.6
Retained Earnings	37,128	31,890	16.4
Preferred Stock	31,960	30,125	6.1
Long-Term Debt	133,644	124,292	7.5
Total Capitalization	$278,464	$254,786	9.3
Current Liabilities			
Short-Term Debt	$4,779	$5,862	(18.5)
Long-Term Debt Due Currently	4,075	3,207	27.1
Other Current Liabilities	26,678	23,305	14.5
Total Current Liabilities	$35,532	$32,374	9.8
Deferred Credits			
Accumulated Deferred Income Taxes	$19,378	$17,311	11.9
Accumulated Deferred Investment Tax Credits	12,855	10,927	17.6
Other Deferred Credits	6,356	5,207	22.1
Total Deferred Credits	$38,589	$33,445	15.4
Total Capitalization & Liabilities	$352,585	$320,605	10.0

*Includes other utility plant of combination gas and electric companies.

Retained Earnings

Total capitalization increased 9.3 percent to $278 billion. Retained earnings, which reflect reinvestment of equity returns, increased 16.4 percent and have been growing at a greater annual rate since mid-1983 than any other component of the capital structure. The industry's equity ratio grew to 40.5 percent at March 31, 1984, while the long-term debt ratio fell to 48.0 percent. Even though certain state commissions have addressed increasing equity ratios and some companies have taken measures to constrain or reduce their equity ratios, certain segments of the industry continue to have heavy needs for new equity.

Interest charges on long-term debt totalled $3.3 billion in the first quarter of 1984, 8.6 percent higher than the first quarter of 1983. Pre-tax interest coverages continued to improve during the twelve months ending March 31, 1984, reaching 3.12 times (including AFUDC), a level not exceeded since 1970.

Despite the apparent improvement in the industry's financial performance, bond rating changes indicate a reduction in financial flexibility for many companies, particularly those with existing construction programs. During the first quarter of 1984, 15 electric utilities had their senior debt securities downgraded; only 6 were upgraded. Of those companies downgraded, 11 have *active* nuclear construction programs and average ratios of construction work in progress to total equity of 121 percent versus 20 percent for those companies which received increased ratings and 90 percent for the industry as a whole.

The financial distress of individual companies also had its impact on the industry's average common stock dividend. Actions taken by two companies during the first quarter of 1984 affected the industry's average common dividend increase, holding it to 1.9 percent. Excluding those companies, the average dividend was $0.53 in the first quarter of 1983 and $0.56 in the first quarter of 1984, an increase of 5.7 percent. The impact of subsequent dividend actions will be even greater in the second quarter of 1984.

Tables 1 and 2 are based on unaudited reports submitted by a sample of electric utilities. The utilities used in the sample account for 95 percent of the industry's revenue from sales to ultimate customers and 94 percent of the industry's total assets. The data was expanded to represent the entire investor-owned electric utility industry.

Contributed by the Finance Department of Edison Electric Institute.

TECHNOLOGY REVIEW

UTILITY COAL ASH

By Tobias Anthony

More than 800 million tons of utility coal ash are accumulated in disposal areas around the nation's coal-burning power plants. Some 70 million tons of this mineral were stockpiled in 1983 alone. And, within ten years, because of the increased use of coal to produce electricity, the annual production rate of coal ash is expected to reach 100 million tons.

Despite its abundance, however, coal ash remains an undiscovered resource in America. If utilized, it could contribute importantly, for example, to increasing the tax base for financially strapped communities, to lowering the costs of constructing highways and bridges, to offsetting the constant depletion of valuable agricultural soils, and to a variety of as yet unresearched purposes. For the nation's electric utilities, coal ash offers a source of revenue not fully realized as well.

Once, it was the dream of the oil industry to utilize every drop of oil that came out of the ground. This has been accomplished. But with coal and coal ash, the story is different. Despite its low cost, availability, and multiple known uses, only 20 percent of coal ash is utilized, primarily in low-volume cement replacement applications.

REVIEWS

In 1985, more than half of the electric energy generated and used in the United States will be produced by utility companies burning 633 million tons of coal—an estimated two-thirds of this country's annual coal-burn. The resulting ash will amount to the nation's fourth largest mineral resource, surpassed in availability only by stone, sand, and coal. Because utilities have placed ash in central disposal sites, these huge quantities are available for above-ground "mining."

As it is produced, coal ash is either "fly ash," the fine, powder-like substance caught in special collectors, or "bottom ash" or "boiler slag," the coarser, heavier material that falls to the bottom of the giant coal burning furnaces. Fly ash, which represents about three-fourths of the total mineral, is the most versatile in applied uses.

For example, fly ash can be utilized in: brick manufacture, roofing felt, mineral-wool insulation, highway sub-grading, metal reclamation, fighting forest fires, controlling mine subsidence, asphaltic concrete admixture, absorbing oil spills, dewatering sewage sludge, improving sand moldings, sanitary landfill cover, and structural fill.

Bottom ash can be used for: sand blasting grits, water treatment filtration, road de-icing, cold mix asphalt, and structural fills.

The safe, controlled use of coal ash has received the endorsement of the U.S. Environmental Protection Agency, which says, "any purchase of cement or concrete made with Federal funds, either directly or indirectly, should specifically allow for fly ash to be used as an optional or alternate material, unless it can be shown that the use of fly ash is technically inappropriate for a particular construction application."

The Federal Highway Administration of the U.S. Department of Transportation states that the greater utilization of coal ash is a "more prudent use of our resources that is both economically desirable and technically feasible."

In Washington, D.C., the National Ash Association has analyzed present-day uses of coal ash, and projected future utilization in order to provide guidelines aimed at total use of the product. At present, the primary use of the mineral is in the production of high-quality (pozzolan) cement. But the potential for utilization in land re-development, soil stabilization, agricultural applications, road-base construction, and other smaller volume uses is significant.

An imaginative and precedent-setting demonstration of high-volume ash utilization has recently been initiated in Maryland by the Baltimore Gas & Electric Company (BG&E). More than 200 acres of land with marginal development potential will be filled during the next 10 years with an astonishing 1.8 million tons of coal ash to develop a new, high-value office and industrial park. This forward-looking project not only allows for maximum use of the company's coal ash resource, but also creates finished industrial park building sites that will be valued at an estimated 7 to 10 times their purchase price. BG&E's ash utilization venture represents both a valuable improvement for the utility and a significant community project that will generate a positive impact on the local tax base.

In Montgomery, West Virginia, the Appalachian Power Company used 350,000 tons of fly ash to stabilize a low-lying housing development site 15 miles from a coal-burning electricity-generating plant. The ash fill ranged in depth from 3 to 11 feet and was covered with a foot of top soil. The building lots were approved for FHA financing for the construction of homes.

Not far away, the West Virginia State Department of Highways was completing 80 miles of secondary road construction utilizing more than 100,000 tons of "ashphalt" paving material made from the coarser boiler slag/bottom ash generated at nearby coal-burning plants. Compared to using traditional resources, a substantial cost saving was realized at this project, and the material proved easier to handle since it is applied cold and weather was not a deterring factor on the job.

And in Morgantown, West Virginia, in a demonstration showing the viable utilization of coal ash in agricultural applications, the U.S. Energy Research Center reclaimed an acid-surface mine spoil site that was totally absent of any natural vegetation. In this project, fly ash was spread at rates of 150 tons an acre and, after fertilization and seeding, grass and hay yields from the field were comparable to averages throughout the state. The fly ash use was shown to be effective in resolving the acid/alkaline balance problem, as well as enhancing the water holding capacity and improving soil texture. A similar farm land enhancement program was accomplished with equal success recently in Michigan by the Lansing Board of Water and Light.

Utilization of coal ash has been held back by a number of factors. The "we've always used cement, stone, and gravel, so we keep on doing that" concept has resulted in serious lack of awareness of ash advantages by some prospective users. Among utilities, it previously was more economic to simply stockpile the ash, rather than market it. Now, higher coal prices, higher prices for sand and gravel, and the utilities' financial situations are changing that.

The available inventory of coal ash, and the continuous generation of even greater quantities of this mineral, represents an asset that should not become a liability. As more and more coal ash is utilized, stockpiling problems are eliminated, other natural resources are preserved, and high-value and high quality developments and products are created—an unusual phenomenon of all positives.

Tobias Anthony is President of the National Ash Association.

BOOK REVIEW

SUPERMANAGING: HOW TO HARNESS CHANGE FOR PERSONAL AND ORGANIZATIONAL SUCCESS

SUPERMANAGING

Arnold Brown and Edith Weiner
McGraw-Hill, 1984
New York, 283 pp.

By Sue Lerner

Arnold Brown and Edith Weiner, authors of the best-selling *Supermanaging*, are among a growing number of professionals whose job it is to teach us how to do our jobs. For fifteen years, Brown and Weiner have been in the business of minding other people's business. Clients, ranging from Fortune 500 corporations to government agencies and academic institutions, have hired the authors to make their organizations more efficient and productive. *Supermanaging* draws on this practical experience, but the authors are not content to write the usual step-by-step primer for success. They attempt to unravel the complex and comprehensive matrix of factors that are shaping the future of American business.

Supermanaging takes its place among a growing variety of books that tell us how to think, dress, eat, or, in this case, "harness change" for success. The sheer number of these "self-help" books underscores one of Brown and Weiner's most basic premises: the world is an uncertain place, though its inhabitants have a natural desire for certainty. A desire for stability and permanence dictates the need for all sorts of blueprints, theories, and maps that promise to chart a clear course toward success and security. *Supermanaging* offers no such clear-cut route to success because, the authors argue, it is impossible to determine exactly what the nature of success will be in the years to come. If Brown and Weiner provide no map, they do try to give managers a kind of compass by which to steer among those forces that currently threaten to sink the corporate ship.

Supermanaging focuses on how to deal with and master change. The supermanager succeeds not despite change, but because of it. He or she is not intimidated or threatened, but rather "invigorated by the pace, nature, magnitude, and promise of change." Success stems from an ability to resist the lulling effects of social institutions and the tendency to regard such institutions as permanent and invulnerable. Future failures will be inevitable, according to the authors, if today's managers continue to use the traditional, short-sighted methods of the past for gauging what will happen in the future.

A major problem for the potential supermanager is the fact that American institutions have come to base their analyses of the world on increasingly large amounts of quantitative data—from government surveys, consulting firms, computerized systems, and other data-collection sources that monitor practically every aspect of today's business world. The weight and solidity of such documentation leads us to believe that the numbers are real, "not just symbols representing parts of reality." Actual events develop in spite of the data, regardless of it, and even counter to its apparent message because the world we are measuring is increasingly irrational and unmeasurable. As a result, such data are no true guide to the real world in which real people live, produce, and consume.

To readdress this problem, Brown and Weiner sketch a broad picture of the social, economic, political, and technological forces that, in their opinion, are shaping today's environment and that of the future. *Change* is the key element in every circumstance, and the forces of change are, perhaps, more subtle and pervasive than they might appear on the surface. For example, much has been made of the new baby boom that is now underway as the women born during the baby boom of the 1950s are now themselves of childbearing age. According to the most widely held image, today's mothers are very different from the mothers of the earlier generation: they are better educated, have fewer children, and are much more likely to be in the labor force. The "new" family has on the average fewer than two children, and research indicates that an only child fares better than children in general when it comes to intelligence, achievement, relations with adults, and educational goals. Given this rosy scenario, the new boom of babies may mean a future work force with a high proportion of self-reliant and achievement-oriented workers.

However, the new baby boom is not only a product of more affluent, upscale couples, as many market research studies would have us believe. It is also the product of poorer, less-educated, unstable youth—as evidenced by the epidemic of teenage pregnancies. Managers will have to consider the pressures of housing, work schedules, and limited social and public funds, not to mention the potential for class conflict over education and health care as the result of this other and sizeable segment of new mothers. How their children will grow up to influence the work force is even more problematic.

Demographics is only one of a number of factors that the authors examine as forces of change. The others include locomotive technologies, economic transition, and the changing social and political climate. By their own admission, Brown and Weiner provide only the most broad and general discussion of these forces. Implicit in the authors' premise is the belief that merely knowing such forces exist is not enough; one must be prepared to act on this knowledge. As an example, the authors suggest that society in the future may become increasingly divided along the lines of access to and skill with information technologies now considered revolutionary. If information becomes wealth and access to information becomes power, then those who possess that wealth and power may be tomorrow's aristocrats. To be among this future elite, one must be involved *today* in the design and use of the technologies of tomorrow.

The authors' general advice for coping with change can be summed up in the old maxim about keeping your options open. For today's managers who want to be tomorrow's supermanagers, this means not relying on most other old maxims. Don't limit the definition of your business—diversify. Don't trust traditional economic indicators—an informed hunch is sometimes better than a stock market analysis. Don't think that more money will solve all your business troubles—bigger is not necessarily better. And don't believe the promises of those other best-selling books that cite ten easy steps to success—Brown and Weiner are selling a "philosophy," not a formula.

Part of that philosophy involves learning to forget. Too often organizations try to incorporate new systems merely by heaping them on top of old ones, attempting to accommodate all the baggage acquired in all previous trips through the process of change. The supermanager knows how to clean out the corporate closet. To cling to outmoded methods of manufacturing, old product lines, markets, and attitudes is to let newcomers race ahead. Completely new enterprises have nothing to forget, and sometimes that means a greater chance for future success.

Traditional notions about success itself can become a stumbling block. Money, power, fame—the usual trappings of success may involve less glamorous side-effects, like ulcers, divorce, personal disillusionment. While most of us would probably be happy to take our chances with money, power, and fame, few of us will have the opportunity. However, as Brown and Weiner point out, all of us can and should evaluate what success means for us and structure our lives and businesses to achieve these personal goals, not some arbitrary standard.

There are as many kinds of success as there are different kinds of people, and the authors stress that there are an equally great number of ways to achieve success. Supermanaging is a matter of individual style; it's an art, not a science. Even when the authors examine the critical factors influencing management in the future, they focus on broad concepts (vulnerability, legitimacy, morality, transition) and general advice. Anyone looking for a quick management fix will not find it here. Instead, the authors prod our preconceptions about the whole nature of management in an attempt to extend our ways of thinking and arouse our own creative resources.

As a metaphor for society's historical inability to cope with change, Brown and Weiner use the following little parable:

> *Prior to World War II, an American general observing British army maneuvers*

R E V I E W S

noted that mobile artillery pieces were served by seven soldiers, one of whom did nothing but stand at attention while the other six readied and fired the gun. Upon inquiring, he discovered that no one could tell him what the seventh man was for. Intrigued, he pursued the matter until he found out that in the old days, before trucks, the seventh man held the horses. The horses went, but the structure, now useless and wasteful, remained.

The illustration is, perhaps, even more apt than the authors intended. They exhort the reader to understand that planning for change is more than a new discipline—"it's a whole new philosophy." Be assured, however; the authors of *Supermanaging* foresee no genuinely revolutionary change, philosophic or otherwise. One is unlikely to question the expediency and meaningfulness of a job when it is one's own.

The authors' major contribution is to raise some interesting questions and explore a wide variety of issues, often in surprising and illuminating ways, and to provide a useful tool for comprehending the environment to deal optimally with change.

Sue Lerner is Director of Corporate Planning for Edison Electric Institute.

STATISTICAL REVIEW

FIRST QUARTER SALES OF ELECTRICITY UP 11.3 PERCENT

Sales of electricity reported by the investor-owned electric utility industry for the first quarter of 1984 were 11.3 percent greater than in the first quarter of 1983. As in recent quarters, strong gains in the economy-sensitive industrial sales led the increase; however, the increased sales in the weather-sensitive residential sector served to narrow the difference in contribution that each sector made. In all, the industry sold 440 million megawatthours (MWH) in the first quarter of 1984, 45 million MWH more than in the first quarter of 1983. On an annual basis, sales were up 7.2 percent for the year ending March 31, 1984, outpacing, for now at least, most growth forecasts. Customer growth in the first quarter showed moderate gains, increasing 1.8 percent over the first quarter of 1983.

Increased MWH sales of electricity to ultimate customers, both during the quarter and the twelve months ending March 31, 1984, have been driven to a great extent by the economic recovery. Sales to industrial customers increased 12.8 percent in the first quarter of 1984, compared to an 11.1 percent increase in sales to residential customers during a quarter which was colder than the comparable quarter of 1983. Sales to commercial customers were 10.0 percent higher in the first quarter of 1984, a lower relative increase than the other major customer classes despite having a greater relative increase in its customer base.

For the twelve months ending March 31, 1984, sales to ultimate customers increased 7.2 percent to 1,683 million MWH from 1,570 million MWH during the year ending March 31, 1983. As in the case of the quarterly sales increases, sales to industrial customers for the twelve month period increased at a greater rate than the other major customer classes and accounted for 40.4 percent of the increase in total sales to ultimate customers. Industrial sales accounted for the greatest percentage of increase in total sales in three of the four quarters of the year ending March 31, 1984.

During the first quarter of 1984, the average increase in the Federal Reserve Board Index of Industrial Production (less electricity component) over the first quarter of 1983 was 15.8 percent, compared to an average increase in the fourth quarter of 1983 of 15.4 percent. However, on a monthly basis, the Index peaked in February with an average increase of 16.2 percent and increased at a decreasing rate in March and April when the average increase was 14.9 percent.

Contributed by the Statistics Department of Edison Electric Institute.

Table 1

Customer, Sales, and Revenue Data
Investor-Owned Electric Utilities

	Quarter Ending March 31,			Year Ending March 31,		
	1984	1983	% Increase	1984	1983	% Increase
Number of Customers						
Residential	65,990,420	64,886,054	1.7	65,417,730	64,450,376	1.5
Commercial	7,908,438	7,725,337	2.4	7,854,893	7,685,365	2.2
Industrial	387,514	385,296	0.6	391,035	384,526	1.7
Street & Highway	111,440	114,013	(2.3)	113,806	112,931	0.8
Other Public Auth	137,466	136,743	0.5	138,471	136,480	1.5
Railroads	23	23	0.0	23	23	0.0
Interdepartmental	623	486	28.2	529	465	13.8
Total Customers	74,535,924	73,247,952	1.8	73,916,487	72,770,166	1.6
Electricity Sales (MWH)						
Residential	155,679,023	140,153,665	11.1	560,870,778	521,080,884	7.6
Commercial	114,819,953	104,418,426	10.0	454,959,759	428,553,097	6.2
Industrial	155,621,943	137,965,252	12.8	613,836,961	568,184,147	8.0
Street & Highway	2,711 533	2,812,283	(3.6)	10,355,528	10,603,339	(2.3)
Other Public Auth	10,283,992	9,048,346	13.7	37,618,659	36,479,256	3.1
Railroads	542,403	500,204	8.4	1,971,426	1,896,163	4.0
Interdepartmental	736,772	701,230	5.1	3,019,057	2,936,658	2.8
Total Sales (MWH)	440,395,619	395,599,406	11.3	1,682,632,168	1,569,733,544	7.2
Revenues ($000)						
Residential	$10,823,133	$9,478,828	14.2	$40,411,735	$36,112,348	11.9
Commercial	7,995,230	7,174,372	11.4	32,172,006	29,582,515	8.8
Industrial	7,628,136	6,831,357	11.7	30,079,033	28,244,923	6.5
Street & Highway	274,553	270,182	1.6	1,062,848	989,878	7.4
Other Public Auth	525,574	448,596	17.2	1,973,213	1,788,460	10.3
Railroads	35,818	32,832	9.1	129,285	127,589	1.3
Interdepartmental	26,849	23,352	15.0	105,950	100,831	5.1
Total Revenues*	$27,309,293	$24,259,519	12.6	$105,934,070	$96,946,544	9.3

*Includes sales to ultimate customers only.

REVIEWS

REGULATORY REVIEW

SMALL SCALE HYDRO

Regulatory relief, market guarantees, and tax incentives enacted by Congress since 1978 have encouraged the development of small scale hydroelectric projects. Between 1977 and 1981, a thousand-fold increase in preliminary permit applications occurred. Projects are now moving to construction, and as many as 400 new projects are scheduled to be operating by 1987. These, and the attention that has been drawn to the relicensing of existing projects by the preference controversy, have heightened the interest in the environmental implications of hydropower development.

In a roughly 70-page enclosure to a letter to Congressman Richard Ottinger (D-NY), dated February 17, 1984, Raymond J. O'Connor, Chairman of the Federal Energy Regulatory Commission (FERC), responded to a host of questions concerning small hydroelectric projects. Many of the questions focused on such topics as cumulative environmental impacts, compliance with the National Environmental Policy Act, impacts on fish, wildlife and other environmental values, and consistency with comprehensive state river basin plans.

These questions and answers proved to be the precursors to oversight hearings on the FERC's small hydro program held before the House Energy and Commerce Committee's Subcommittee on Energy Conservation and Power on September 11, 1984. At the hearings, Chairman O'Connor provided an update to his earlier response to Congressman Ottinger. His testimony also highlighted recent court and Commission decisions affecting small hydro development and discussed drawbacks of proposals to transfer the FERC's comprehensive planning and licensing functions to state or regional bodies. Chairman O'Connor spoke of a need for legislation to strengthen FERC's license revocation authority. He also suggested the need for congressional scrutiny of the notice provisions of the Federal Power Act and state water quality certification under section 401(a) of the Clean Water Act, to ensure that it is not used improperly by states to veto hydropower development.

Close on the heels of Chairman O'Connor's February letter, Senator George Mitchell (D-ME) introduced S. 2361, the "State Comprehensive River Planning Act." The bill would authorize development of state comprehensive river basin plans to be approved by FERC. Applicants for hydroelectric project licenses would be required to certify that the proposed project complied with the state plan. More recently, on September 6, 1984, Congressman James Jeffords (R-VT) introduced a bill (H.R. 6198) that would amend the Federal Power Act to delegate the authority to license small hydro projects to the states. In each instance, the legislation would significantly increase the state role in licensing hydroelectric projects.

FERC's comprehensive role in licensing hydroelectric projects and conditioning them to protect the public interest was narrowed somewhat by a May 1984 decision by the U.S. Supreme Court. In *Escondido Mutual Water Co.* v. *LaJolla Band of Mission Indians,* the Court agreed with the U.S. Court of Appeals for the Ninth Circuit on an important issue: in an original license for a hydroelectric project FERC, under section 4(e) of the Federal Power Act, must accept, without modification, conditions that the Secretary with jurisdiction over a federal reservation (such as Indian lands or national forests) deems necessary to protect the reservation. This decision gives those Secretaries the upper hand in protecting environmental and other values on the federal reservations. But, the impact of this holding is limited because the Court expressly declined to decide whether the section 4(e) provision applies to relicensing proceedings.

On another front, the FERC has voluntarily limited its role under section 30(c) of the Federal Power Act in assessing the environmental effects on fish and wildlife resources of projects proposed for licensing exemptions. In *Olympus Energy Corporation,* the Commission held that the Public Utilities Regulatory Policies Act (PURPA) gave the U.S. Fish and Wildlife Service and state fish and game agencies the exclusive authority and responsibility to determine an exempted project's impact on fish and wildlife resources and to prescribe measures to counter any adverse impacts. FERC reserved for itself the role of determining whether the proposed project meets exemption criteria and of weighing non-fish and wildlife public interest concerns.

In the relicensing of existing hydroelectric projects, a June 1984 decision from the U.S. Court of Appeals for the Ninth Circuit will have a marked impact on the relicensing process if the decision is not reversed. In *Confederated Tribes and Bands of the Yakima Nation v. FERC,* the court ruled that FERC (1) failed to fulfill its statutory obligations to consider and adopt measures to mitigate the effect of the project on fisheries and (2) erred in not preparing an environmental impact statement [EIS] under the National Environmental Policy Act prior to issuing the new license.

FERC, in asking that the case be reheard, characterizes these holdings as "in effect, reading 'reopener clauses' out of Section 6 of the Federal Power Act and adopting an automatic EIS requirement as to all relicensing cases under the act."

The environmental concerns in *Yakima* were advanced by the petitioning Indian tribes and the National Marine Fisheries Service and by intervenors in the proceeding, the Washington State Departments of Fisheries and of Game and the National Wildlife Federation. The National Wildlife Federation, along with other Indian tribes, also participated in *Tulalip Tribes of Washington v. FERC,* a case that invalidated the FERC definition of a natural water feature exemption. The *Tulalip* court held that under PURPA only those projects that do not require a dam or impoundment are eligible for a natural water feature exemption.

The involvement of environmentally concerned parties and intervenors in cases such as these, and the interest of some environmental organizations in the hydro relicensing legislation pending in Congress, indicate a trend that may become increasingly apparent in future relicensing cases. Organizations and government agencies having environmental protection as their mission may well seize the opportunity afforded by relicensing proceedings to seek terms and conditions to protect fish, wildlife, and other environmental values in new licenses for projects built years ago. FERC, working with other federal and state agencies, intervenors and applicants, will have the delicate task of striking a balance between the power potential of these projects and protection of important environmental values.

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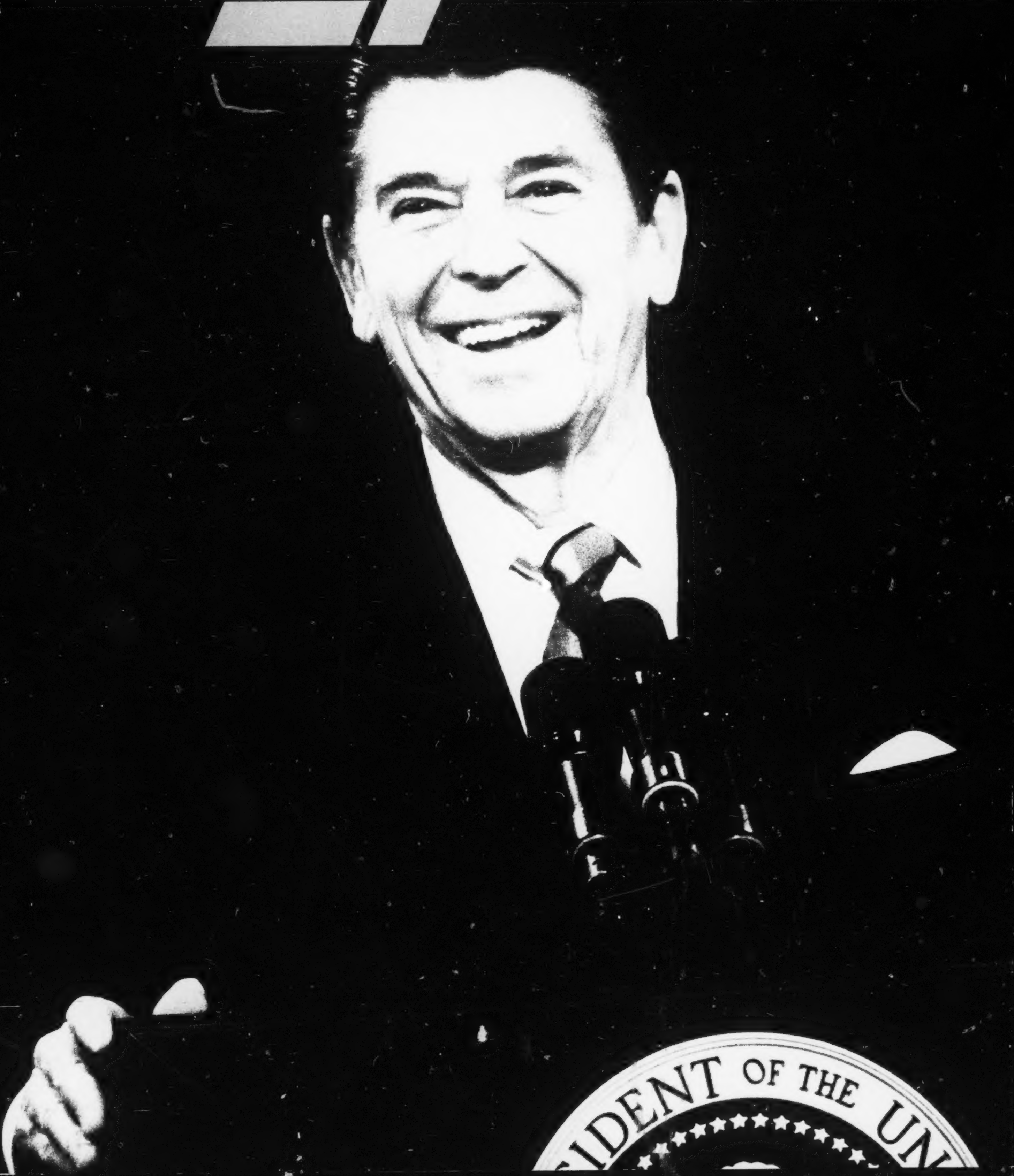
WINTER 1984

ELECTRIC PERSPECTIVES



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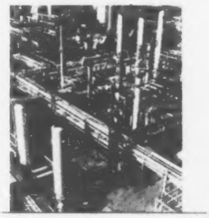

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Part of the nation's history since Columbus, Hispanics today represent a growing segment of the population that cannot be ignored.

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INDUSTRIAL ELECTRIFICATION—WHAT WILL IT DO TO DEMAND?

By John Druke

John Druke is a Kennedy Fellow at the Kennedy School of Government, Harvard University.

From 1960 to 1982, U.S. industry cut the amount of energy it used per unit of output produced by a whopping 41 percent. Over the same period, however, its electricity use per unit of output grew by about 10 percent, even though its share of total electricity consumption was shrinking dramatically—from 51 percent in 1960 to 37 percent in 1982.

What do these trends mean—what are the underlying factors responsible for them and what do they tell us about future industrial demand? As part of an ongoing effort to answer these questions, this past summer Edison Electric Institute's Energy Modeling and Economic Research Department undertook a study of industrial electrification focusing on the relationship between electricity demand and electrotechnologies in the six industrial groups that consume the most energy. The following report is based on that study.

The impetus for industrial electrification is simple: many innovative electricity-based technologies have been developed that are intrinsically less costly than the processes they replace. The new technologies reduce costs by capitalizing on electricity's unique physical properties. For example, because electricity is an "organized" form of energy, it can interact directly with substances of a specific quality at the molecular level. It also can exert forces on matter through a distance, allowing friction to be minimized in an electric motor, for example, and for practical purposes it can be considered massless.

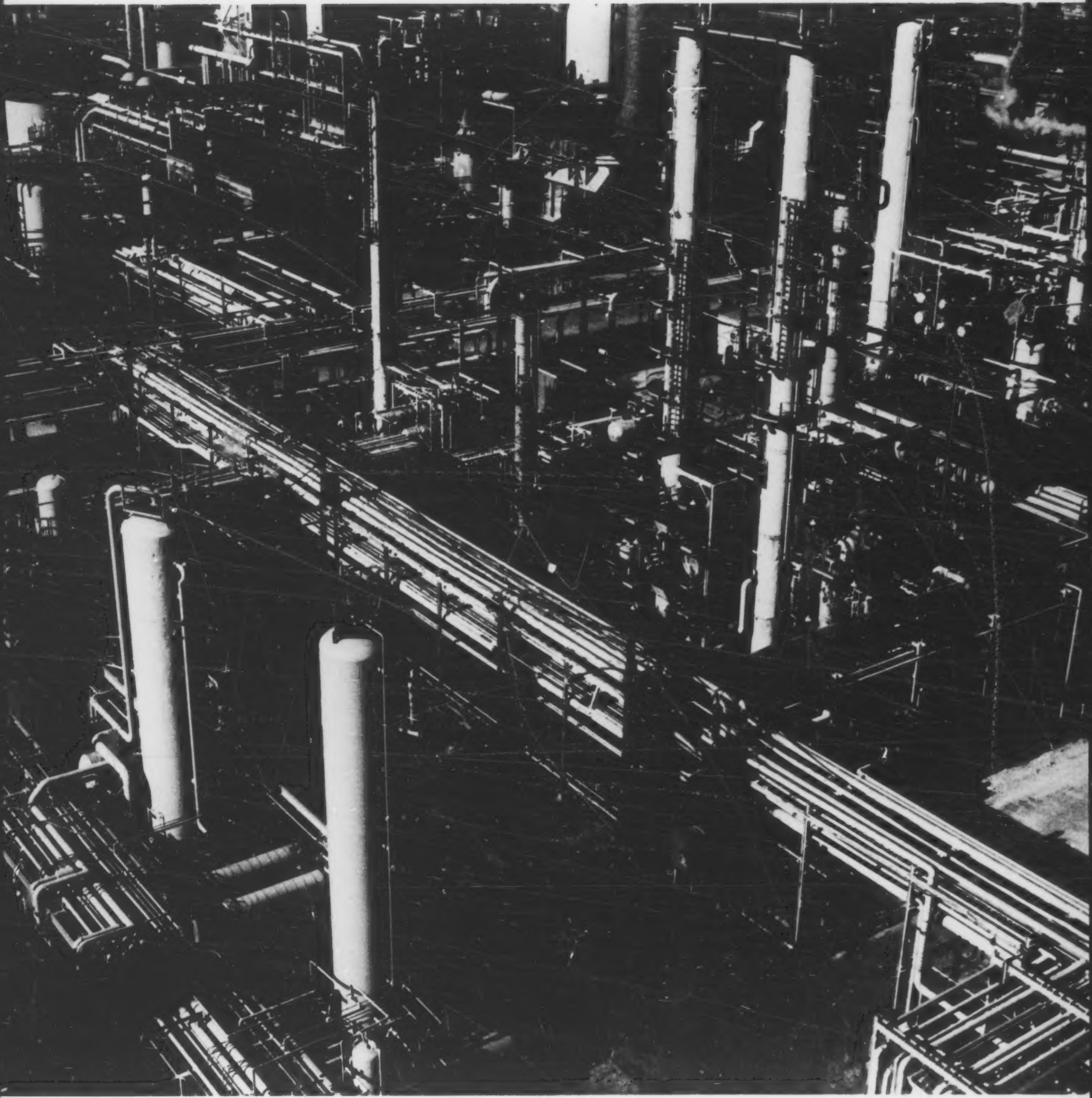
These unique characteristics give rise to other unique and attractive qualities: electricity can heat substances to tens of thousands of degrees; it can deposit energy at every point in a given volume of matter, unlike combustion gases, which can deposit energy only at the surface of a material; it allows the precise control of electrical processes—exact amounts of electrical energy can be used and what is used can be precisely applied.

All of these qualities have important economic implications when applied to production processes. The processes can be accelerated, and they are generally cleaner. The physical size of production equipment can be reduced. The precise controllability of electricity allows the use of exact amounts of energy, materials, and time. As a result, potential costs due to all inputs—energy, materials, labor, and capital—can be reduced.

Aggregate Trends

As shown in Figure 1, two industries, primary metals and chemicals, dominate the consumption of electricity in the manufacturing sectors. Numerous other industries have secondary consumption levels: food; paper; petroleum; stone, clay, and glass; machinery; electrical equipment; and transportation equipment.

This distribution alone, however, tells us little about where new electricity-based technologies might be adopted most advantageously. For those signs we must look at the total energy used by the various industries. Figure 2 shows that six industrial groups dominate the consumption of fuels: food; paper; chemicals; petroleum; stone, clay, and glass; and primary



The chemicals industry, above, along with primary metals, dominates the consumption of electricity in the manufacturing sectors.

. . . new technologies reduce costs by capitalizing on electricity's physical properties.

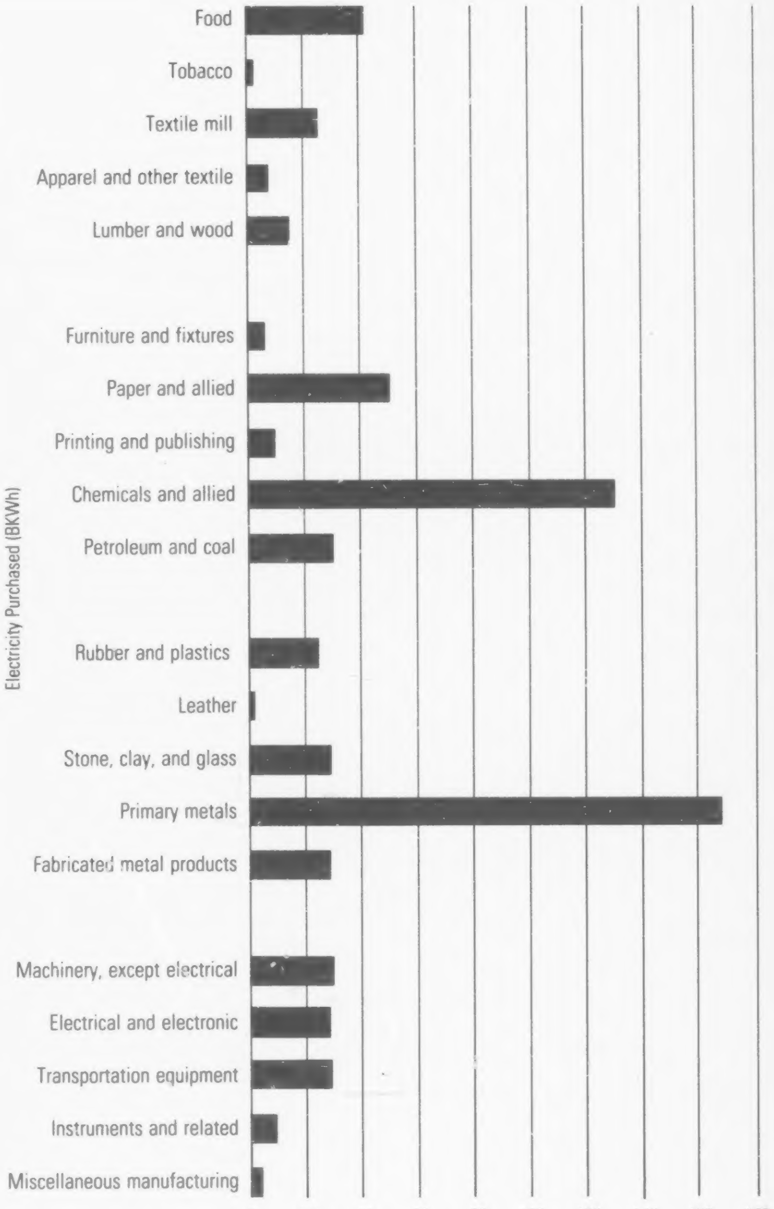
metals. Moreover, the major portion of these fuels is consumed to provide heat for manufacturing processes, an area where the unique qualities of electricity can be used to gain an economic advantage.

Focusing even closer on the process heat requirements of each of these groups suggests which of them have the most to gain from greater electrification. Table 1 shows what percentage of each industry's requirements is for low, intermediate, and high temperatures.[1] Nearly all of the energy consumed in the food industry, for instance, is used at temperatures beneath 350°C. At the other end of the spectrum, primary metals uses the greater portion of its energy at temperatures higher than 1000°C. Those industries requiring the higher temperatures should have the greatest incentive to use technologies that take advantage of electricity's ability to heat materials to higher temperatures faster and more efficiently than other fuels.

An examination of the 1960-82 trends in electric intensity[2] for the six industries reveals the extent to which this expectation is fulfilled. Food and chemicals, both of which use over 90 percent of their energy at low temperatures, showed consistent declines in electricity intensity, food since 1975 and chemicals since 1960. The electric intensity—in primary metals and petroleum, both of which use the greatest portion of their energy at intermediate or high temperatures, increased steadily. In stone, clay, and glass and in pa-

Figure 1

Purchased Electricity by Industry Group, 1981



per, the electric intensity trends are not so cooperative—stone has remained relatively unchanged and paper has risen. Still, the lower temperature energy industries tended to show decreases in electric intensity while the higher temperature industries showed increases.

What do these trends mean? One interpretation is that changes in electric intensity for a given industry signal changes in technology used within that industry. The changes in electric intensity can provide leads indicating where to look for technology changes and what type of technology changes to expect. For example, we would look to the primary metals industry for technological innovations—new processes—that use greater amounts of electricity than previous processes, while in the food industry, we would look for factors that have led to conservation of electricity.

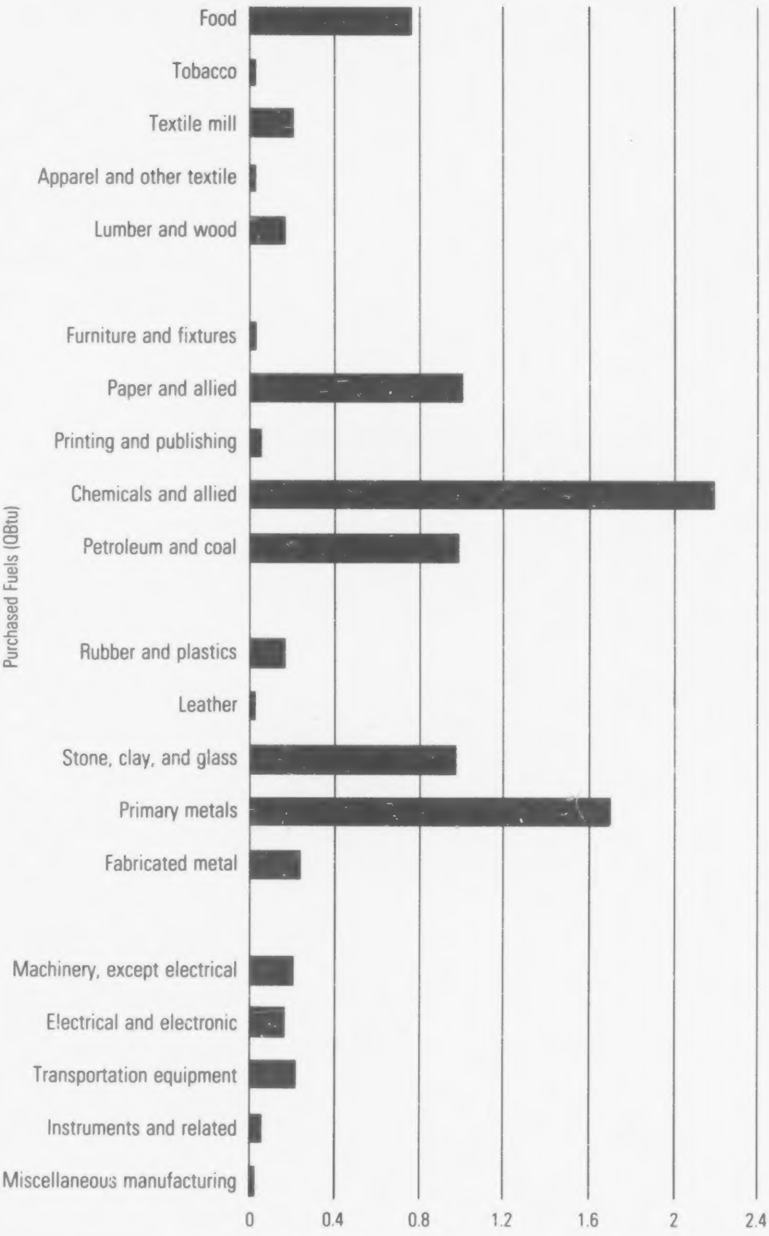
Of course, care must be taken in making these interpretations because changes in the electric intensity of a given industry group can result from other factors. For example, within a single industry, shifts in demand towards products that are more electric intensive can result in an increase in the industry's overall electric intensity. Or, basic conservation measures can lead to decreases in electric intensity even though no real changes in production processes are occurring.

Electrotechnologies' Impacts on Electricity Demand

By looking at specific electricity-

Figure 2

Purchased Fuels by Industry Group, 1981



The stone, clay, and glass industry is among the six industries that dominate the consumption of fuels.

consuming technologies, it is possible to gain a deeper understanding of the process of industrial electrification. Many electrotechnologies are in various stages of development or use. Some are just attaining technical feasibility while others, long-proven technically, are just gaining economic viability as a result of recent fuel price shocks. Still other technologies have gained wide acceptance and are standards within their respective industries.

Philip Schmidt has summarized the characteristics of 24 of these electrotechnologies.[3] Table 2 presents some of them, along with some of their important characteristics, by the industries in which they are applicable.

Not all of these technologies have established technical feasibility or economic advantages over their predecessors. Some technologies—the Alcoa electrolytic metals reduction process and the various plasma-based processes—are still in the development stage. In addition, not all of these technologies are more electric intensive than the technologies they are replacing. The Alcoa process and the adjustable-speed AC drives are replacing technologies that already use electricity as the primary energy source. In fact, these two technologies find their advantage in being able to reduce the electric energy required in the production processes.

What impact will these electrotechnologies have on future industrial electricity demand?

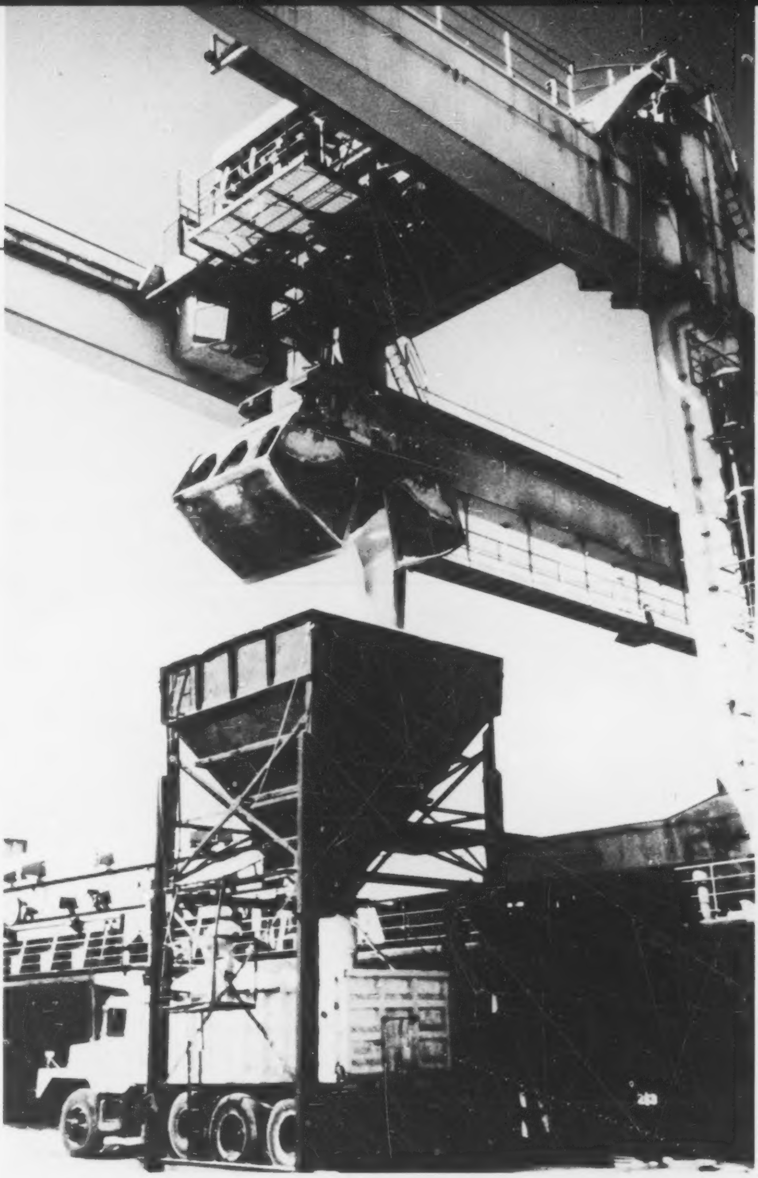


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Table 1

Process Manufacturing Heat Requirements (1974)

Process Manufacturing Activities	Low Temp. Energy % less than 350°C	Intermed. Temp. Energy % between 350°C-1000°C	High Temp. Energy % higher than 1000°C
Food	97	3	0
Paper	92	0	8
Chemicals	86	11	3
Petroleum	32	68	0
Stone/clay/glass	11	22	67
Primary metals	8	0	92

> ***. . . of particular interest to us is the influence of technological change.***

Two studies have given some indication of what the ultimate answer might be.

MATHTECH, Inc., conducted a detailed analysis of the factors that influence industry's electricity demand and provided forecasts for electricity demand in the year 2000.[4] Among the factors studied were economic growth, output, employment, trade, and technological change. Of particular interest to us is the influence of technological change. Included in this analysis were process changes in the chemicals, iron and steel, aluminum, and paper industries. The forecast results, with the impact of process changes, are shown in Table 3.

It is noteworthy that an increase in industrial electricity demand due to process changes is projected—electricity consuming changes outweigh the effects of electricity conserving changes. However, the increase in electricity demand due to process change is only 0.8 percent of the total increase in industrial electricity consumption, suggesting that changes in electricity consumption due to process changes are negligible compared to changes caused by other factors.

Even more noteworthy is the fact that the effects of "efficiency improvements," such as "high-efficiency motors, and variable speed and power factor controls," are not included in the process changes. The effect of such efficiency improvements, given in Table 4, are calculated separately. They are projected to save 82 trillion Btus of electricity, five times the increase in electricity consumption caused by process change. Clearly, increases in electricity consumption due to process changes easily can be outweighed by other factors.

The Electric Power Research Institute (EPRI) also is conducting an analysis of electrotechnologies and has projected electricity consumption by each of the

Table 2

Electrotechnologies by Industry Group

Industry	Electrotechnologies	Primary Competitors	Economic Advantage Established?	Electricity Consuming or conserving?
Food	Microwave Heating and Drying	Fossil-Fueled Ovens	Yes	Consuming
	Infrared Drying and Curing	Fossil-Fueled Heating	Yes	Consuming
	Adjustable-Speed AC Drive	Traditional AC Drive	Yes	Conserving
Paper and Pulp	Microwave Heating and Drying	Fossil-Fueled Ovens	Yes	Consuming
	Adjustable-Speed AC Drive	Traditional AC Drive	Yes	Conserving
Chemicals	Infrared Drying and Curing	Fossil-Fueled Heating	Yes	Consuming
	Adjustable-Speed AC Drive	Traditional AC Drive	Yes	Conserving
	Electrochemical Synthesis	Electrochemical Synthesis	Yes	Conserving
	Plasma-arc Prod. of Chem.	Conventional Thermal Cracking	No	Consuming
Petroleum	Adjustable-Speed AC Drive	Traditional AC Drive	Yes	Conserving
Stone, Clay and Glass	Direct Resistance Melting	Gas-fired Forehearth	Yes	Consuming
Primary Metals	Direct-Arc Melting	Basic Oxygen Furnace	Yes	Consuming
	Electrolytic Metals Reduct. (Alcoa Process)	Bayer/Hall-Heroult	No	Conserving
	Electroslag Processing	Vacuum-Arc Remelting	Yes	Consuming
	Induction Melting	Fossil-Fueled Furnace	Yes	Consuming
	Plasma Processing	Direct-Arc Melting	No	Consuming
		Blast Furnace	Yes	Consuming

In the iron and steel sector, electrotechnologies influence every step of production.

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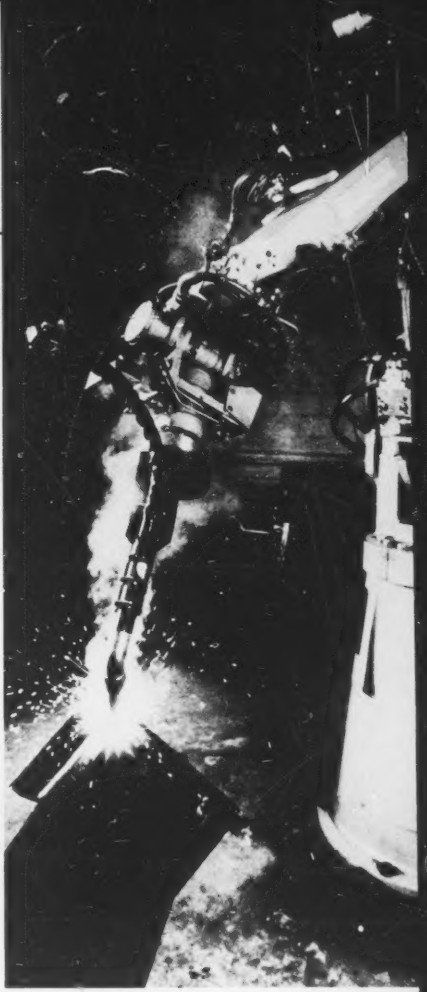

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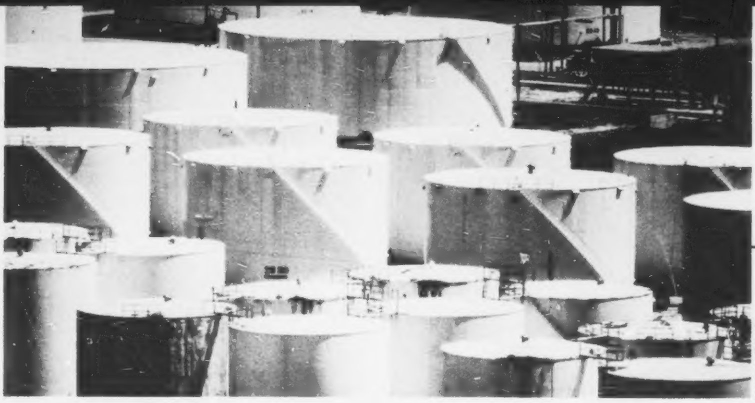
technologies for the year 2000.[5] Although the study is not complete, preliminary results project a tremendous increase attributable to these technologies—roughly 800,000 million Kilowatt hours (KWh), almost equal to the total electricity purchased by the total industrial sector in 1980.

Care must be taken in interpreting these projections, however. In fact, little can be concluded from them about the aggregate effect of electrotechnologies on industrial electricity consumption. Some of these technologies are replacing technologies that already consume large amounts of electricity, and they will have the effect of conserving electricity. These technologies—adjustable-speed AC drives, electrolytic reduction, electrolytic separation, and electrochemical synthesis—make up a major portion of the electricity consumption increase projected in the EPRI study. If these technologies are removed from consideration, the net increase in electricity consumption due to the remaining technologies is about 170,000 million KWh. And still, the effect of removing the old technologies' electricity consumption has not been accounted for.

Industrial Electrification in Primary Metals

A market penetration analysis of electrotechnologies in the primary metals industry illustrates how industrial electrification may affect electricity demand. In the iron and steel sector, for example, electro-technologies influence every step of production. The process of converting iron ore and scrap into finished steel is outlined in Table 5, along with the electrotechnology that can be used at each step.[6] The Fisher-Pry diffusion model was selected to project the market penetration these technologies would achieve by the year 2000.[7] The model is based on the observations of historical process changes that have taken place in industry. A new product typically undergoes an initial period of slow growth while bugs are ironed out and potential users wait to see what impact it has on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The petroleum industry uses the greatest portion of its energy at intermediate or high temperatures.

Table 3

The Impact of Process Changes on Purchased Electricity Demand

	1976 (trillion Btu)	2000 (trillion Btu)
Base Case Demand	2590	4620
Base Case without Process Change	—	4603
Increase as a result of Process Change	—	17

Table 4

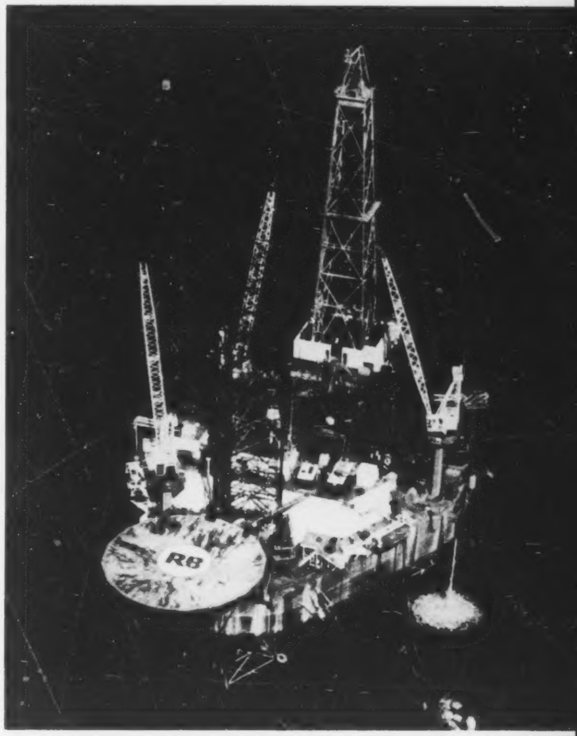
The Impact of Efficiency Improvements on Electricity Demand

	1976 (trillion Btu)	2000 (trillion Btu)
Base Case (with efficiency improvements)	2590	4620
Base Case (efficiency held at 1976 levels)	—	4702
Savings due to efficiency	—	82

Table 5

Steel Production Process

Process step	Electrotechnologies
Primary steps:	
Iron-ore reduction	Plasma-arc furnace
Iron production	Plasma-arc furnace
Steel production	Electric-arc furnace
Secondary steps:	
Casting	Induction heating
Reheating	Electric Induction
Rolling	—
Annealing	Resistance heating
Heat treating	Resistance heating
Forging	Induction furnace Resistance heating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the "innovators" willing to try it. After the viability of the product has been established, it gains wide acceptance and goes through a period of rapid growth within the market. As the market penetration nears completion, its growth rate naturally slows. The result is an S-shaped curve for the market share over time. Given a product's current market share, the Fisher-Pry Model projects its particular curve.

Because the plasma-arc furnace has not yet reached full commercial development, the model cannot project its future penetration. However, laboratory tests on the technology have been completed and first-time commercial-scale installations

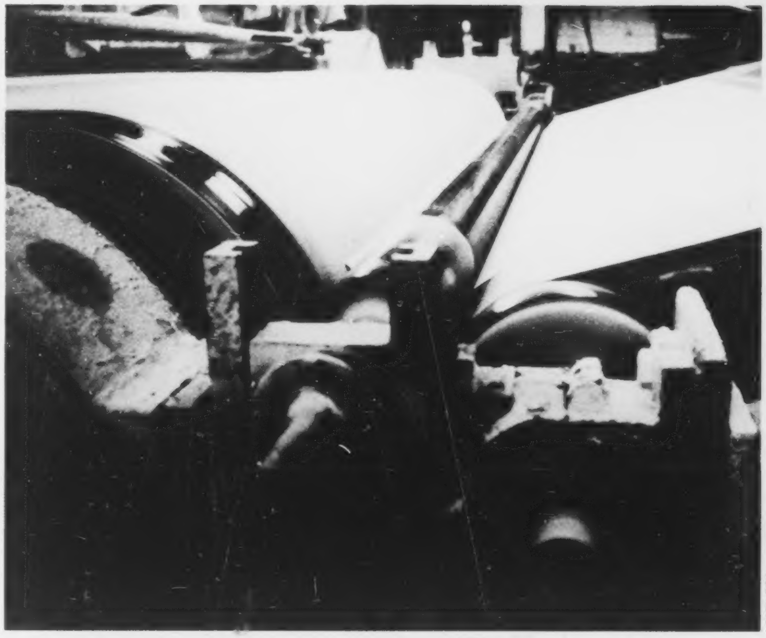
. . . sectors that use considerable amounts of process heat may also turn to electrotechnologies . . .

are being tested now to demonstrate the technical feasibility of plasma-arc metals reduction. Preliminary economic analyses indicate that plasma-arc furnaces may provide significant cost savings.

In contrast, the electric-arc furnace has been in use since the early part of this century. First, it was used primarily to produce specialty steels, about 10 percent of overall steel production. During the late 1960s, however, its use expanded into other areas of production, and now it is used to produce approximately 30 percent of all steel. Using the Fisher-Pry diffusion model, it is projected that roughly 60 percent of all steel will be produced with the electric-arc furnace by the year 2000. If present-day domestic production levels of steel are maintained, that translates into doubling of electricity consumed by electric-arc furnaces, from 18,000 million KWh today to 36,000 million KWh in the year 2000.[8]

Of the two remaining processes, induction melting is the more significant. Induction melting is used in metal casting and, like the electric-arc furnace, its use began to increase significantly in the late 1960s. In 1981, approximately 30 percent of the iron cast was heated in induction furnaces, consuming about 20,000 million KWh. According to the model, by the year 2000 about 55 percent of all the iron cast will be produced with induction furnaces.

Thus, on the basis of the electric-arc and induction furnaces alone, the electric inten-



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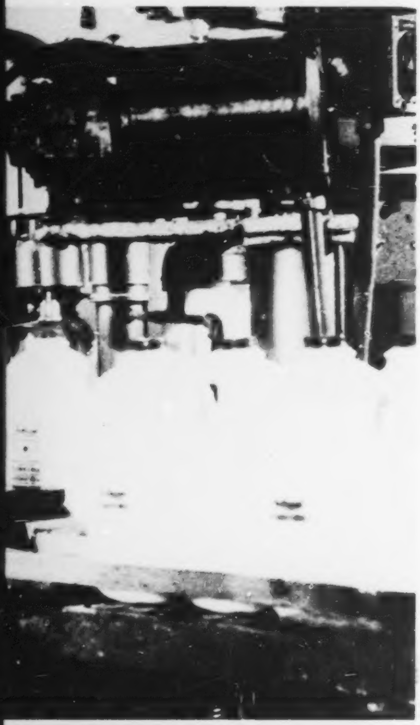
In the food industry, above and below right, conservation is a factor. In the paper industry, below left, electric intensity has risen.



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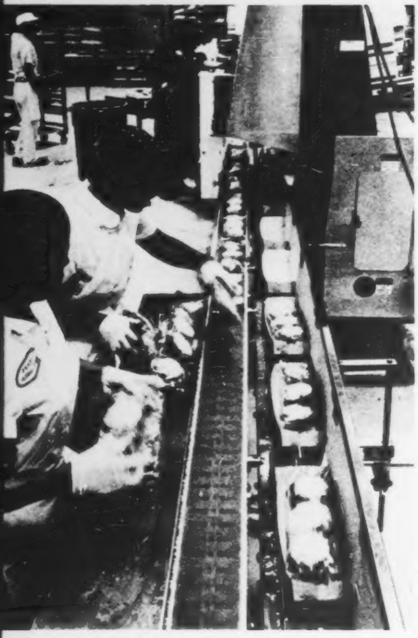

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sity of the primary metals industry could increase about 35 billion KWh by the year 2000. And, when applied to the entire manufacturing sector, the Fisher-Pry model projects electricity consumption at 60 percent of total industrial energy consumed in the year 2000. At 1981 energy consumption levels, that amounts to an increase in electricity consumption from 660,000 million KWh to 926,000 million KWh.

Conclusion

Although electricity consumption per unit of output is declining in most industrial sectors, it is increasing in some industries that use a significant amount of process heat. The primary metals industry provides the most dramatic example. Its electric intensity has increased by 70 billion KWh since 1960. A shift toward the use of electricity-based technologies is part of the reason for the growing electric intensity of primary metals, and that shift is expected to continue. Other industrial sectors that use considerable amounts of process heat also may turn to electrotechnologies to reduce production costs. In addition, however, new technologies are being developed that conserve electricity. In several industries, these technologies and other factors have combined to reduce the intensity of electricity use, and one study indicates that technology substitution will have a negligible effect, compared to other factors, on the overall change in industrial electricity consumption. ▰

NOTES

1. C. C. Burwell, *The Role of Electricity in American Industry*, Institute of Energy Analysis, Oak Ridge Associated Universities, 1984.
2. Electric intensity is measured as the power purchased divided by the output index relative to the output index for 1967 = 1.00.
3. Philip Schmidt, "Electricity and Industrial Productivity: A Technical and Economic Perspective," prepared for the Electric Power Research Institute, 1983.
4. MATHTECH, Inc., "An Assessment of Factors Affecting Industrial Electricity Demand," A report for the U.S. Department of Energy (No date given).
5. Electric Power Research Institute, "Industrial Electrotechnologies and Electrification Program Plan," May 1984.
6. This process is outlined in EPRI report EA 2761.
7. J. C. Fisher, and R. H. Pry, "A Simple Substitution Model of Technological Change," *Technological Forecasting and Social Changes* 3, 77-88, 1971.
8. Case assumptions: Electric-arc furnaces consume 500 KWh/ton of electricity; production level of steel is 120 million tons.

WHAT HAPPENED? WHAT DOES IT MEAN? WHO'S IN CHARGE?

November 6, 1984—In an important victory for the President, with important gains for his party in the House of Representatives, and in hundreds of other national, state, and local elections, the sum of the parts that equal the American democratic process once again manifested itself.

To begin to analyze the results and study the possible impact of the November 6 elections, Edison Electric Institute (EEI), through its Governmental Affairs Planning and Coordination Division, invited Washington political consultants Bernadette Budde, Kevin Gottlieb, and Eddie Mahe, Jr., to share their "morning-after" views with a gathering of member company representatives, EEI staff, and related individuals—over 100 altogether.

What follows on these pages are the edited versions of their remarks as well as selected questions and answers from the audience participation portion of the program.

Bernadette Budde runs the political education program for the 3,000 member Business-Industry Political Action Committee. She also edits BIPAC's monthly report on congressional activities and electoral patterns, *Politikit*, and *Politics*, a digest of trends and developments in the political world. Perhaps EEI Vice President for Planning and Coordination Dave Parker described Budde's political import best when he said, "When anyone is considering running for a federal office at the Senate or House level, you can be sure that one of the first visits they pay to anybody in Washington, D.C., is to Bernadette. They want her ideas, her input, and her advice."

Presently the executive assistant to Senator Donald Riegle of Michigan, *Kevin Gottlieb* has been on academic leave from Syracuse University for the past six years to work in the United States Senate. In his first Senate position as Energy Advisor to Senator Wendell Ford, Gottlieb worked on the development of the first National Energy Policy in 1977. He later served as executive assistant and legislative director to Alan Cranston and managed the successful reelection campaign for Riegle. Gottlieb was director of Walter Mondale's Presidential Exploratory Committee until March 1983 when he came to his present position. He has written and lectured about public policy for two decades.

Eddie Mahe, Jr., has played an integral part in Republican Party politics for many years. Presently, he is President of Eddie Mahe, Jr., & Associates, a political consulting firm. In addition to his consulting work, Mahe is President of Precision Targeting, Inc., a communications targeting and geodemographics firm for direct mail and media buying. Mahe is also founder of Campaign Works, a bi-partisan organization that provides political education for corporations and trade associations. He continues to conduct a variety of training seminars for Republican candidates and campaign workers and for organizations such as the American Society of Association Executives, the American Medical Political Action Committee, and the American Bar Association.

Ed Castle

REAGAN IN '84
RE-ELECT 1984 REAGAN
JOBS ★ PEACE ★ OPPORTUNITY MONDALE '84
REAGAN BUSH '84
PEOPLE for REAGAN BUSH 1984
REAGAN
MONDALE for America FERRARO
REAGAN 84
REAGAN '84
MONDALE FERRARO
MONDALE READY TO WORK FOR AMERICA
NOW! 1984

The American democratic process once again manifests itself.

Charles Feil

Bernadette Budde: "I decided we had five elections on November 6."

[redacted]

To me, the most remarkable aspect of all of the election night coverage is how overlooked the survivability of the Democratic incumbents in the House of Representatives actually was. The television networks kept focusing on the landslide, the avalanche, whatever they wanted to call it. But in my view, that really isn't what it was all about.

I decided we had five elections on November 6—four in addition to the House races. The Presidential race to me was separate; Senate races seemed to be very separate; governors' races seemed to be very separate; and, since my knowledge of state legislative races is limited, I can only conclude that they had to have a different pattern as well. So you could easily find five different sets of coalitions operating out there.

FRITZ
BUSTERS

The conclusion, which many of the network commentators drew, that there is realignment—that Catholics, blue collar ethnics, working women, all of these people have formed an alliance with the Republican Party—may only be true in the Presidential aspect of the five different kinds of elections that we had.

Looking numerically, the Democrats gained two seats in the Senate, the Republicans gained 14 seats in the House, and exactly 5 percent of the incumbents who sought re-election were defeated. So we go through these elections to find out what history tells us is going to happen, that 95 percent of the incumbents will get re-elected, even in a supposedly landslide year.

Looking by region at the House gain of 14 seats for the Republicans, there was only one gained in the West, supposedly Ronald Reagan's best territory. There was a net gain of six in the South where big swooping coattails went through North Carolina and Texas. In the Midwest, the Republicans gained a net of two, and, in the East, in what should have been the Republicans' worst area, they gained a net of five because they didn't lose anything.

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Perhaps they were Phil Gramm's, not Ronald Reagan's, coattails in Texas.

To me, the question to ask ought to be why were so few seats gained? My pre-election projections were in the low teens, but I'm always very low and very skeptical because I like to be pleasantly surprised. But many people projected in the low 20s, and there were even people who were projecting 30 or beyond.

Why weren't more seats gained? Well, one reason was that the incumbents found that Ronald Reagan's prairie fire was coming, and they heard the whistle blowing long before the smoke got to their rooms. Then they hid behind the fire walls of their safe congressional districts, drawn for them just recently in 1981 and 1982. They stuck on their asbestos suits, which you could easily say were their constituent services. And if all else failed, they had the fire sprinklers ready to start at any moment, the sprinklers being the dampening cross-currents that were already stirring in some instances in their own states. The incumbents reacted as incumbents always do, with the survival instinct, and that's probably not a big surprise because they had such a big early warning.

Another reason there were so few Republican gains is that so few seats were open—only 27. The Republicans had 14 and the Democrats had 13 in the House. Well, the Republicans did very well; they picked up 6 of those 13 open Democratic seats. You can extend the logic and say, had there been 30 open Democratic seats, the Republicans would have picked up the same ratio of them, which would have been 15, but there were simply tons of incumbents hanging around this year.

> ***There are going to be only seven new faces in the Senate . . .***

Another reason for the low level of Republican gains is that the coattail factor did not materialize in the 11 states that I call sole-tails, or pure-tails, where only Reagan and candidates for the House were running. Now, the theory was that if there weren't any local cross-currents to interfere, Republicans should have gained the bulk of their seats in those states. Well, the Republicans did get a few seats that way—one each in California, Connecticut, and New York. But they came out of Florida and Pennsylvania with no gains, and they came out of Ohio down one. When that happened, you knew you were in for a very long night of not very many gains.

Coattails did not materialize in what I call high-tail states either. In these states, there was somebody on the ballot locally who would do well, plus Ronald Reagan, so the House candidate would have a coat with two tails to grab onto, one with each hand. Take Virginia, for example, where everyone knew that John Warner was going to run away with it. Republicans gained nothing in Virginia.

The surprising states were the ones that I call cross-coattails, which means that there was something local on the ballot. In Texas, for example, we weren't exactly sure how the Texas Senate race would affect congressional campaigns. As it turned out, they were phenomenally successful for Republicans. You can probably argue that they may not have been Ronald Reagan's coattails that brought in four seats in Texas; maybe they were Phil Gramm's. In North Carolina you could probably argue that they were not so much Ronald Reagan's coattails as they were Jesse Helm's and Jim Martin's.

Another reason there were so few Republican gains is that very little was done to undo the so-called fluke of 1982, to restore the seats lost then or in 1980. There was very little cashing in on people who ran in 1982, lost, and hoped to make 1984 a better year. Few people who ran for the second time were able to win. The states that lost big seats in 1982, such as Pennsylvania and Virginia, didn't produce any gains.

Also, a lot of the 17 new seats created by the redistricting in 1981 and '82 were supposed to have been created for the Republicans; remember when that was the big story? Well, the Republicans gained two of those.

I think massive ticket-splitting also weakened the coattail factor; that's the kind of thing that I did not get from any of the networks on election night. I'm not sure who those ticket-splitters were, probably the groups traditionally part of the Democratic coalition such as urban blue-collar ethnics, maybe southerners. Obviously, they found that voting for Democratic candidates for the House did not compromise their voting for Ronald Reagan.

Looking over the new Congress, the first thing to look at in the Senate is the question of whether there will be movement: will Jesse Helms take over Foreign Relations? I think the answer is yes. But other than that, there's probably not going to be a whole lot of flipping around based upon who won and lost. For the majority leader in the Senate, Richard Lugar still has the inside track. I don't think the elections affected that at all.

MONDALE
FERRARO
REAGAN
84

There are going to be only seven new faces in the Senate, and they're very experienced people. Four are from the House: Gore, Harkins, Simon, and Gramm, and not a shrinking violet among them. One is a former governor, one a former lieutenant governor—no shrinking violets—and one a former county executive. These people have experience, unlike all those new faces of 1980 who had never run for anything before. They thought it was kind of groovy to run for office, and they were going to run the Senate like a business. You now have people who understand the legislative and political process.

UNIPHOTO

John Warner's run-away victory in Virginia had no impact for Republicans in that state.

Also, there are prima donnas, and it's going to be hysterical to watch them tripping over one another to get to the nearest television camera.

In the House, I would ask whether 14 is enough to switch the ratios on committees, particularly to unstack Ways and Means, Appropriations, Budget, and whatever else may have "too many" Democrats.

The new faces in the House are also surprisingly experienced. Of the 44 freshmen, I count 21 who have been in the state legislatures, and some of them have been fairly powerful. Two are former Congressmen, and 15 are what I call quasi-political in their backgrounds; i.e., they have been local officers (we have two sheriffs) or they have been involved in some Hill office (like Larry Combest, who worked for John Tower in Texas). Only six are politically new faces.

How well would the Republicans have done if their candidate had been Walter Mondale instead of Ronald Reagan?

The heavy breathers—those fairly right-wing in their attitudes and not ashamed to be so—are people like Bob Smith in New Hampshire, Tom DeLay in Texas, Pat Swindall in Georgia, and Helen Bentley in Maryland. You will know she is there.

In terms of the House leadership battle, the real loser was Jim Wright. If I wanted to be the next Speaker of the House, I'd want as many Democrats in my own state delegation as I could find. In effect, Wright's down five, including throwing away the Phil Gramm seat to a Republican. Somebody from California or Pennsylvania may have a bigger base than Wright does.

I think we got some very confusing messages in this election. To me, the scariest part is that there weren't any coattails. But what if *this* were coattails? What if the Republican Party, without Ronald Reagan, is 1982? What does that mean for 1986?

[illegible]

If the Democrats' future is to begin from the base of support left over from November 6, then indeed, the Democrats' future is quite dismal. Clearly, the Democratic Party at the national level is poorly designed to battle over the themes for the country, over the geographical balance of politics, and over the electoral college. We're just not put together right in order to do it.

I think the Reagan victory really is a testimony to an individual who knows both his strengths and his weaknesses, who knows how to get the most out of himself, and who knows how to apply himself to a specific task with targeted energy. It's also a testimony to a party that

REAGAN IN '84
BUSH IN '88
PRESIDENT
REAGAN

basically rebuilt itself in eight short years. Many of us feel that if only Gerald Ford had won in 1976, the Democratic Party would be a lot better off today. Indeed, when Ford lost, the Republican Party did the reassessment that was necessary—the one that the Democratic Party did not do in 1980. As a result, in eight short years, the Republican Party has the makings of a very, very strong national party for some period of time.

The Republicans are remarkable at the way in which they market candidates and messages. They're remarkable about how they achieve results with a relative minimum of wasted effort. But I find myself wondering, as I admire their skills and insights, how well they would have done if their candidate had been Walter Mondale instead of Ronald Reagan.

Those who saw Walter Mondale's concession speech on November 6 I think, in all fairness, would have to say that he is a decent man, with basically decent intentions and concerns for the country, who handled an obviously humiliating situation with a measure of grace and dignity.

PEOPLE
for
REAGAN
BUSH
★ ★ ★ ★
1984

UNIPHOTO

Charles Feil

Kevin Gottlieb: "Were the voters voting for the man or for the mandate?"

Given that kind of a person, who is obviously not good at all the things that Ronald Reagan is very, very good at, the interesting thing to me will be to look at 1988 in terms of the Republican Party and to see, first of all, how well it handles the fratricide that is going to occur on its side. Secondly, once the Republicans come up with a candidate, the question will be how well can the marketing mechanism work when they have to market something less than the likes of Ronald Reagan.

Obviously, this election sends the Presidential aspirants, the campaign managers, and the political pundits back to the design board for 1988.

I believe the Reagan team broke ground in the area of nonpolitical political television commercials. I think that they will be the wave of the future. I think that we'll see more and more of the candidates' not being a part of the actual political ads themselves.

The voter registration strides on the part of the Republican Party are also noteworthy. They were taken with more care and targeting than those on the Democratic side. I heard Jerry Falwell on election night when he made it quite clear that these efforts are made every year and not simply for a single election.

The third area where the Republicans broke new ground is with the 18- to 25-year-old voter. I have taught on university campuses for 20 years, having taught approximately 20,000 students over that period of time. I've been through the sixties and seventies with university students and now into the eighties. I've seen the evolution of the student mind. I've also seen the degree to which it can oscillate and be capricious. But the one thing that has impressed me about the way the Republican Party has gone about looking at the 18- to 25-year olds is that it wants to give them a stake in the operation so they will realize that their investment has a decent return and therefore, that they ought to keep investing in the corporation. It will be interesting to see whether or not variables between now and the 1988 election mitigate their commitment.

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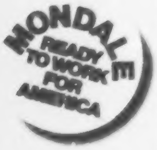
"In terms of the House leadership battle, the real loser was Jim Wright."

I think the fourth and last area where the Republicans broke new ground is in the con-

I don't think Democrats can ever go back to where the Democratic Party was . . .

tinual use of electronic methods for voter targetting, voter contact, and, more specifically, voter motivation—getting people to the polls.

It seems to me that the most interesting question that comes about from election night is: Were the voters voting for the man or for the mandate? That question will forge specific directions that may be followed in these ensuing years. The evidence in my judgment would suggest that voters were voting more for the former than the latter. They chose the man, not the mandate. I make this assertion, first, because I think the Reagan campaign emphasized general themes, not specific issues. Second, the Reagan campaign emphasized style, perception, image, and appearance of a man, not the substance, facts, limits, or reality of specific problems and specific policies. I think that was a very smart thing to do, and it was done impeccably.


MONDALE
READY TO WORK FOR AMERICA

UNIPHOTO

Richard Lugar and Robert Byrd: Senate majority and minority leaders?

The third reason that I think the voters were voting for the man is that for all of the Reagan team's effort and its candidate's genius and skill, it could not sew coattails on the President's jacket. For example, the gains in the House were modest, even by comparison with the Republican Party's stated goals. The losses in the Senate also were significant, especially considering that the President invested so much of his own time in the two weeks preceding the election trying to bring home perhaps the two biggest losers—and I don't mean that in the pejorative sense—Percy and Jepsen. Finally, the relatively non-existent gains at the state capitals and in the state legislatures, in my judgment, do not auger well for those Republicans who were hoping for a mandate for wholesale structural changes in the system.

In short, the much-desired realignment of the party membership and demographics did not occur. It is not likely to occur or to gain force in any serious way over the next four years, given the structural base with which the President must now deal.

Add to this reality the 1986 Senate election lineup and I think there should be serious misgivings on the Republican side. There are 23 incumbent Republican Senators who will be seeking re-election in 1986. Not even my Republican friends in town describe that class, those who came in in 1980, as heavy lifters. Most are first-termers who were washed up on shore by the flood tide in 1980. They know they will have to run with a lame-duck President who must cut spending, raise taxes, and seek his place in history while riding forward on their backs.

Now, if those Senators don't vote for the President's budget cuts, then the President is diminished. If they do vote for the President's budget cuts, then their chances for re-election are diminished. A real Gordian Knot.

In the Senate, seven incumbents are gone, giving the Democrats a net gain of two, which I think is significant given the President's strength. There was only one change on the Senate Energy and Natural Resources Committee; Paul Tsongas is gone. What does this do to the working majority on the Senate side? Regardless of who is going to be the majority leader, the majority, in my judgment, would appear to be diminished at best, and it may be gone. Why? Those 1984 Republican candidates such as Jepsen, Shamie, and Raese, who embraced the President and his positions zealously, almost without reservation, didn't succeed even when he was

Charles Feil

Eddie Mahe:
"... there was not a lot of good news on election night."

MONDALE-FERRARO
FOR NEW LEADERSHIP

on the ticket. Why should the 23 incumbents who are up in 1986 believe that the President will be stronger in 1986 when, one, he's a lame duck; two, he might be saddled with a lame economy; and, three, he will have, no doubt, a legacy of budget cuts, which those Senators may have to vote for between 1984 and '86.

I believe some of these Republicans will stray from the majority in order to protect themselves back home when there is legislation that would be injurious to their own 1986 re-election efforts. When they stray with only a two-seat majority, obviously that's going to be a problem.

In the area of the majority leader, there are five candidates: Dole, Stevens, Lugar, McClure, and Domenici. And I think it's going to be Lugar. It's a secret ballot, and everyone is running around and saying, "Oh, don't worry, you can count on me." Some guy is going to end up with three votes and 26 people saying, "I was with you."

At any rate, I think it's going to be Lugar, and I think he's going to be everybody's second choice. He's not a powerful speaker. He's not a persuasive television personality. The comparisons to Howard Baker will hurt both Lugar and the Party's productivity. As a result, Lugar is not going to add to the strength of the majority in the Senate.

I think Jesse Helms is going to switch over and go with the Foreign Relations Committee. I can just hear the lilting voice as it explains why he must go against what he told the people of North Carolina about staying on the Agriculture Committee—it's going to be a tour de force. Foreign Relations, in my judgment, is a much more powerful committee, especially during times of international uncertainty, and I think we will have that uncertainty during these next four years. And—here comes my next bet—I think Helms is going to run for President.

The Democrats will stay with Robert Byrd as minority leader. He has already lined up commitments and is obviously quite splendid at doing that. The Democrats will make a change in 1986 when they get the majority, but why have internal battles right now?

Final comment: Although there was not a realignment of structure, there was a realignment of theme. I don't think Democrats can ever go back to where the Democratic Party was and have a pretense of being successful at the national level. I think they know it. All the Democrats in Congress who I know beneath the age of 48 know it in their viscera. I think these elected officials, particularly those in the Senate, who have the luxury of the six-year term—are going to tell the traditional wing of the Democratic constituency, "We're going to be espousing a new theme. And we don't give a hoot whether or not you think we're wrong for doing it because you haven't been able to deliver much in the past anyway."

[illegible]

From my perspective, there was not a lot of good news on election night, the President's victory notwithstanding. Given the way the total election came out, 51 percent of the popular vote for the President would have been just as good as the 59 percent he received. The good news that did come out of the election is that, if it holds at 14, Mr. Reagan can say that he has had the best second-term re-election in this century in terms of net gain in the House. The highest before this was with McKinley, who gained 13; President Nixon gained 12 in 1972. So Mr. Reagan will have a record of sorts out of this election.

What we saw on election night was a mandate, but it was a reverse mandate. I do not believe that the voters were voting for any policies articulated by the President. To some extent, they were voting for the fact that economic times are good. But, to a larger extent, I think the vote they were casting was an absolute rejection of New Dealism. The voters were saying—and I think it is particularly true among the young voters—we do not accept the governmental operating philosophy, if you will, of the New Deal. We don't want that anymore. We don't know for sure what this guy Reagan

. . . I think incumbency carried a tremendous driving force.

MONDALE
FERRARO

has because he hasn't said it that explicitly, but we know he's not one of those New Deal folks.

Without question in my mind, Walter Mondale was the best candidate that the New Deal could put up. He understood and was able to communicate with the traditional constituencies involved in that New Deal coalition; he got the support from that New Deal coalition. Obviously, it was not adequate to elect him President.

There has been a lot of discussion about coattails. But the fact is that the only two states where we did see any apparent coattail effect were North Carolina and Texas—the two states where there were strong, heavily contested, philosophically opposed candidates for the U.S. Senate. In those races there were candidates with visibility—which congressional candidates do not get a whole lot of—articulating a sharp contrast, a sharp philosophical, governmental contrast. And I think that is why we saw coattails in those two states, compared to some of the others where that kind of sharp contrast was not drawn.

Another reason we did not see anything resembling coattails is that people were not unhappy about anything. They did not have to go beat somebody up to feel good. They were just able to go in and vote for the incumbents, for the people that were already there. The voter said the status quo is not all that bad: I've got a job; inflation is down; the future may look a little puzzling because of this deficit, but I don't know for sure that I need to worry about that; I'm quite confident I don't need to worry about it if it means raising my taxes; I know if Reagan is President he's going to fight a tax increase, so it's okay if I send this taxing congressman back because he's kind of going to balance it out.

There were a lot of ambivalent feelings that the voters were not able to sort out all that well or clearly. As a consequence, I think incumbency carried a tremendous driving force.

The generic ballot that the Republicans were talking about over the week prior to the election—when voters were asked simply whether they would vote Democrat or Republican—also demonstrates the power of incumbency, I think. The widest gap in the generic ballot was the one put together by the *New York Times*/CBS. On the Saturday before the election, it had Republicans up four points, 48 to 44. I don't want to compromise my good friend Adam Klimer (being with the *New York Times*, he is above all this), but on the Saturday before the election he told me the Republicans would gain 30 seats. I bracketed 28 to 32, so I was off a long way myself from the actual 14.

It will be very interesting to try and find out what was going on with the generic ballot and why it showed stronger Republican support than the actual vote did. Somehow, when the names came into play, the generic ballot figures didn't hold. Again, I think incumbency made the difference here. You cannot have an incumbent congressman's spending a million dollars in self-promotion over a two year period without its having a tremendous impact on his reelection.

In any event, probably everyone in politics is about to go through one of the more fascinating political periods in history. We have an open nomination in 1988—an open nomination with no heir apparent in either party.

Jack Kemp: "most recognized as part of the so-called new generation."

I think that it is true that the Democratic Party is about to jump a generation. But I think whoever is going to do that jumping may end up all wet because I think some of the big constituencies like organized labor are not quite prepared to make the jump. To make the jump in the Democratic Party without organized labor there flapping its wings will be very difficult. Probably every name you hear as a prospect for 1988 in the Democratic Party is of the new generation. The trouble is that many of their coalitions are not yet controlled by that so-called new coalition.

The Republican Party has the more difficult situation because it has not so effectively washed out the old school, those members over the age of 48. There are still too many of them around who are going to be out there on the playing field. I think that's going to be a real problem. Bob Dole, Howard Baker, and George Bush are still part of an older generation, what some of us call the defeatist Republicans, the do-nothing Republicans. Then you have some new ones starting to come along; Jack Kemp, obviously, would be most recognized as part of the so-called new generation.

UNIPHOTO

Bob Dole, left, and Howard Baker, right: "still part of an older generation."

Along with the generation movement taking place in the next four years, we also have a very basic philosophical shift taking place in both parties at the same time. The new liberal Democrats have had their conferences, published papers, gotten books out. They're trying to wrest control from the old New-Deal type of Democrats, those who said government is the solution for everything. The neoliberal Democrats are really not that different; they say government is the solution, but government just must be more efficient.

The same kind of philosophical battle is about to take place in the Republican Party. For years, this party has been dominated, especially in Congress, by people who said close it down whenever they had an opportunity. Their favorite vote was no. This group in the Republican Party brought us to where we are now in many ways. The American people want an activist government, a catalyst for solving problems. They do not necessarily want the government to do it all itself, but they think the government has a role. Too many Republicans say no, government doesn't have a role, close it down, do away with those programs.

A new group in the Republican Party, headed by folks like Jack Kemp and Ben Weber, is now advocating this new activist philosophy—a philosophy that does recognize the role of government in solving problems.

From the perspective of trying to move legislation, trying to get an agenda enacted, trying to stop somebody else's agenda, groups must understand the generational and philosophical conflicts that are going to be taking place up there on that Hill. The odds are overwhelming that our next president is wandering around there someplace, and about half of the people up there think, "It ought to be I."

We have this little hiatus until 1986. From this moment on, what happens in 1986 totally depends on the economy. I think it's going to hold together. I've got to think that; otherwise, it's too bleak. ▰

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IN
'84

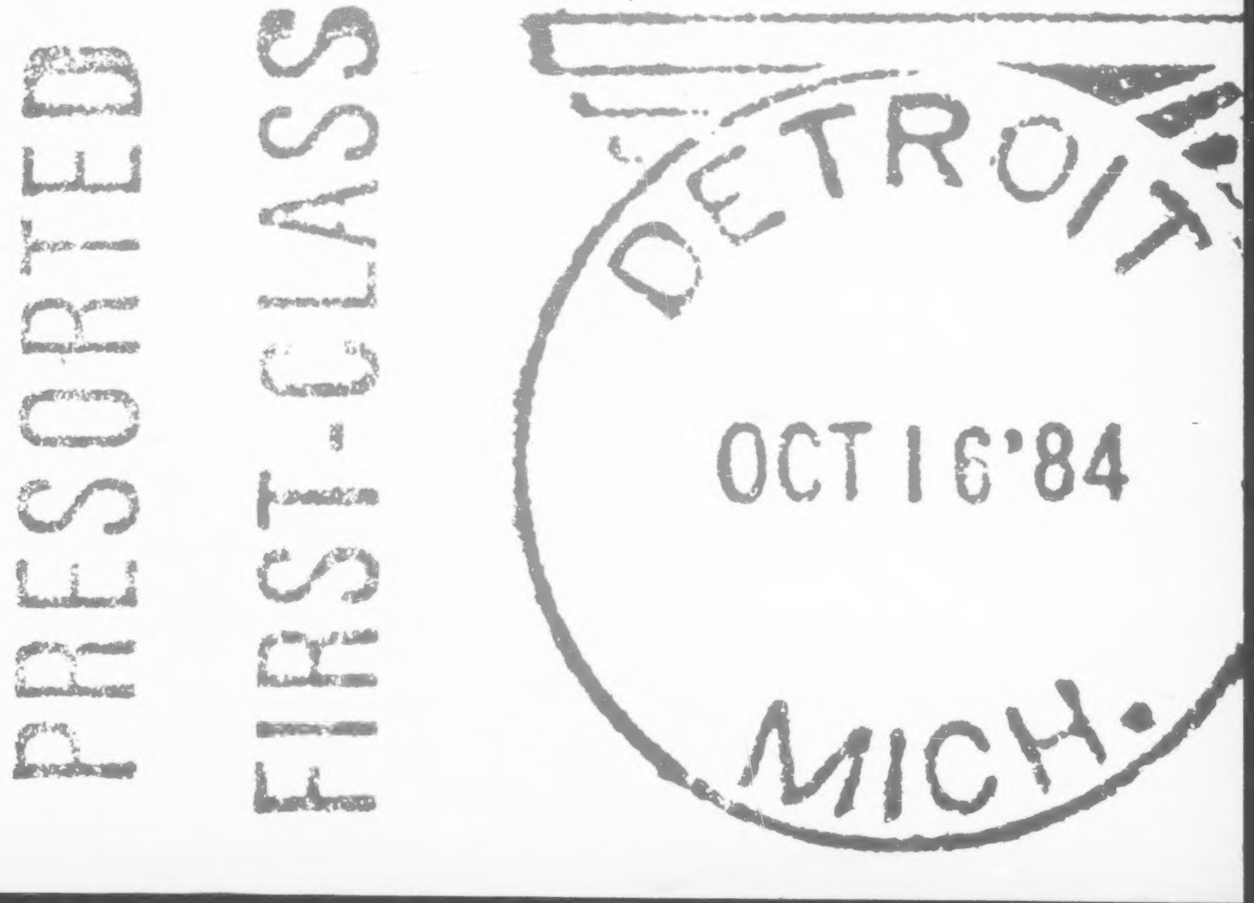
A PENNY SAVED IS $15 MILLION EARNED

Utility efforts in recent postal rate proceedings pay off in significant savings in customer bill mailing.

Although the first-class rate for letters will go up 2 cents in early 1985, the rate for the presorted, first-class mail utilities use in billing will go up only one penny. For the entire utility industry, all electric and gas companies, which mails about 1.5 billion pieces annually, that penny savings will amount to $15 million each year.

This rate development represents a significant effort by utilities that goes back to 1971 when Edison Electric Institute (EEI) and the American Gas Association (AGA) perceived that postal rates and other postal matters would be of increasing importance to the utility industry and each association organized a Postal Affairs Task Force.

In March 1972 following the close of the first postal rate case under the Postal Reorganization Act of 1970, EEI and AGA joined efforts and formed the Council of Public Utility Mailers (CPUM) to represent their interests before the Postal Rate Commission and the U.S. Postal Service. CPUM has participated actively in all subsequent rate cases as well as in a variety of other classification cases involving the Postal Rate Commission. Among its other activities, CPUM was responsible for broadening the membership of the Postal Service's Mailers' Technical Advisory Committee to include first-class



mailers, and it has appeared on numerous occasions before House and Senate Committees considering postal legislation.

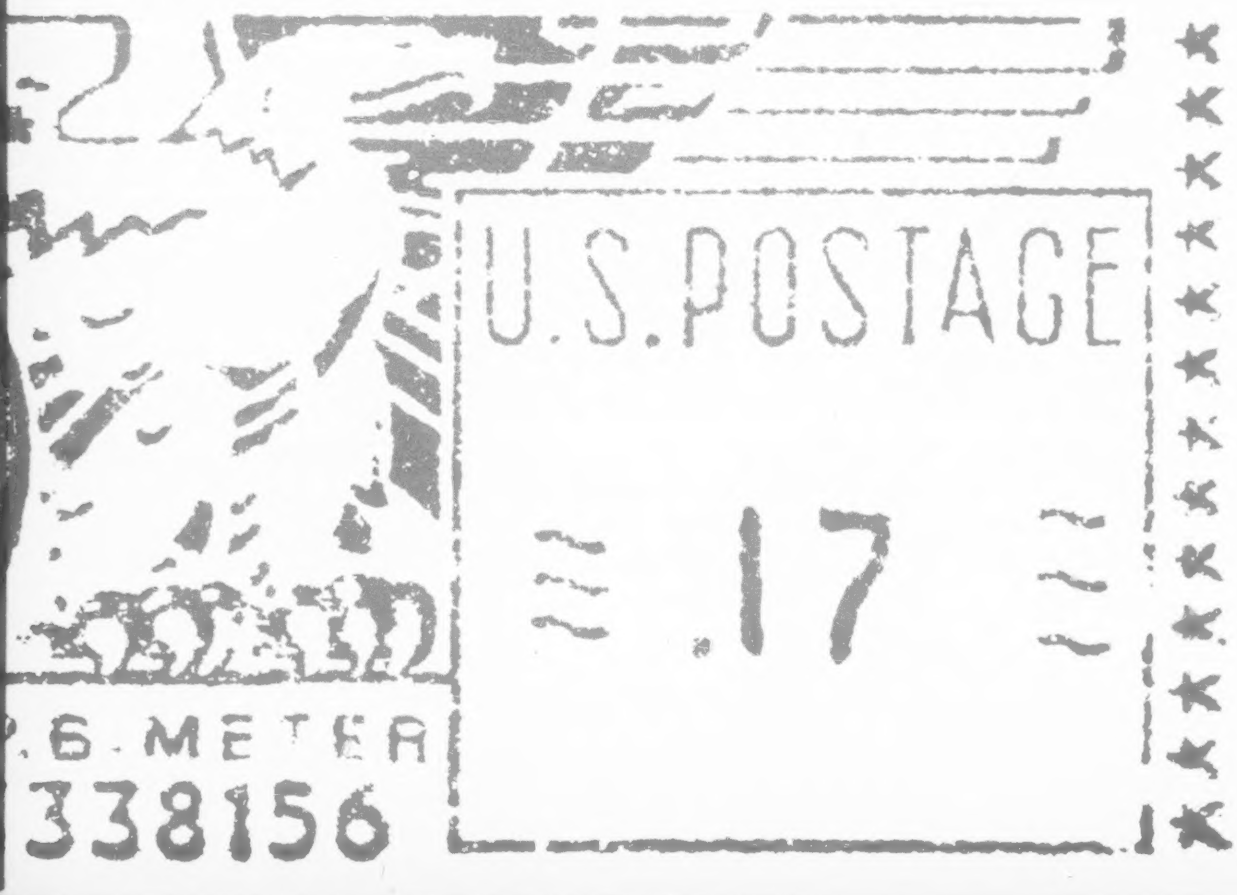
As Special Counsel, Eugene E. Threadgill has been active in representing CPUM since its inception. A former Assistant General Counsel to the Postal Rate Commission, Threadgill joined the Washington, D.C., law firm of Connole and O'Connell in 1972 following experience both in private practice and with the Federal Power Commission.

Recently, Electric Perspectives *visited with Threadgill for his perspective on the latest postal rate developments.*

EP: Can you give us a little background on this recent rate ruling?

Threadgill: It took us three years, from 1973 until 1976, to persuade the Postal Service to establish a bulk, or "presorted," first-class rate. To qualify for the original 1 cent discount, a mailing had to include a minimum of 500 pieces sorted by ZIP codes—not less than 10 pieces per five-digit coding and not less than 50 pieces for a three-digit coding. With anything else, you have to pay the full first-class rate. In 1978 the discount was increased to 2 cents, and in 1981, the Postal Service increased the discount to 3 cents. We argued even then that 3 cents was not an adequate discount—that it should be 4 cents. We even went to the Court of Appeals about it and lost there.

In this present case we surely expected the Postal Service to increase the discount spread to 4 cents. It didn't. Instead, it filed to maintain the 3 cent spread. And the American Postal Workers Union and the staff counsel of the Postal Rate Commission—the Office of the Consumer Advocate—even recommended reducing the spread to 2 cents. Faced with that kind of opposition, we were the only ones who pressed for an increase in the discount. Other first-class presorters merely defended the 3 cents against attack. So the utility industry, plus our joint client, the American Retail Federation, were the only protagonists who sought a 4 cents spread and presented evidence for it. Actually, we asked for 4½ cents. But we got 4 cents, and it is a major victory that will benefit a lot of people—state and local governments, credit card and oil companies, the telephone peo-



ple, insurance companies, banks, a whole gamut.

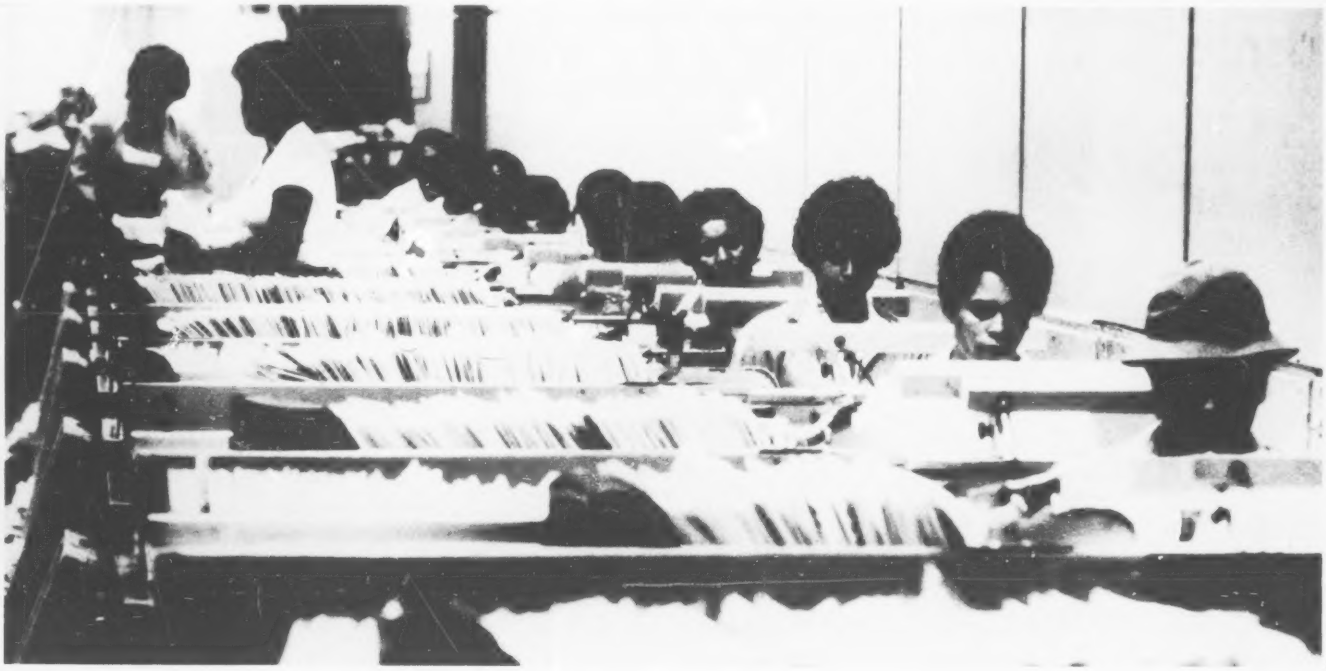
EP: How much is the discount worth to the utilities?
Threadgill: For the electric and gas utilities, who probably mail 1.5 billion pieces of mail annually, the additional one penny is worth about $15 million in savings a year. If these rates remain in effect for four years, that's $60 million.

EP: Isn't there some ambiguity about whether or not this most recent ruling will actually become effective?
Threadgill: Well, this began on November 10, 1983, when the Postal Service filed its request for a rate increase. Under the statute, the Postal Rate Commission had 10 months in which to reach a decision. The Rate Commission reached its recommended decision in early September. Now it goes to the Governors of the Postal Service. The Governors meet once a month for two days to review the policies and activities of the Postal Service. It approved the rate filing in November 1983, and looked at the rate recommendation at its meeting this past October, but there was no discussion and the decision was put off until the November meeting.

EP: Will it pass then?
Threadgill: The whole decision is complex. On top of reducing the presorted rate below that requested on 12 or 14 billion pieces of mail, the Rate Commission's recommended decision also entails reducing the Postal Service's first-class rate increase request from 23 cents to 22 cents —and that's on 60 billion pieces of mail. We're talking about a lot of money to the Postal Service. Then, in addition, the Commission didn't give the Postal Service the full third-class rate increase it requested. As a result of all this, the revenues generated by this set of recommended rates will probably be $2 billion less than the Postal Service asked for.

EP: So is it going to pass?
Threadgill: Will the Postal Service sit still for it? Will it try to get the recommendation changed? If it tries to get it changed, will it go back and ask for a reconsideration of everything, or just the first-class and third-class rates? These are very

Almost 85 percent of the Postal Service's costs are for labor or related expenses.



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> *'. . . these rates are high enough to get the Postal Service by for three or four years.'*

complex questions. My present feeling is that the Postal Service can live with what is recommended. The Postmaster General has stated publicly that if he got the rates he requested last November, he expected them to remain in effect for five years. Now, with the lower rates recommended by the Rate Commission, it just means that the Postal Service will reach the time when it needs to file a new rate request sooner. That's all. So these new rates would be in effect for 1985, '86, and '87, with a new request filed sometime in 1987 to be effective in 1988 instead of a year later. My feeling is that these rates are high enough to get the Postal Service by for three or four years. The Postmaster General is leaving and there has to be a new Postmaster General. It's a political year, so why rock a lot of boats?

EP: Whatever the size of the increase, what will the revenues it generates cover?

Threadgill: The Postal Service is very labor intensive—85 percent of its costs are labor or related costs. The postal workers have cost-of-living adjustments in their contracts. Consequently, when inflation was 8 or 9 or 10 percent, the Postal Service's costs were going up that much each year. There has been a bit of increased productivity, and a good bit of this increase is attributable to mailer presorting. So, as the gross volume of mail goes up, a proportional increase in labor is not required. Nevertheless, the Postal Service's costs probably will go up about 3 or 4 percent a year. So, you figure in four years it will probably need at least another 10 percent on top of the 10 percent in the present package—another 2 or 3 cents to the 25 cent level. Of course, we would then ask for a 5 cent discount.

When the Postal Service filed this rate request it actually projected it would be in a deficit for fiscal 1984. Now, as all of the numbers for the year are coming down, they're actually in a break-even position for the year. Instead of a deficit of $500 million, they're running about $500 million ahead of what the estimates were. And that's because the volume of mail is going up very rapidly, both in first-class and third-class, with large increases in presorted and third-class mail. One of the big fights is between the newspapers and the third-class mailers. The newspapers want third-class rates raised higher so they can capture more of the third-class type of newspaper enclosures, and, of course, the third-class mailers want to keep the rates down so they can keep the newspapers from siphoning off all of these inserts.

Sue Klemens

Eugene E. Threadgill, special counsel to the Council of Public Utility Mailers.

EP: How did CPUM engineer its success in the recent rate proceedings?

Threadgill: We put on a good case. Actually, we put on three witness. Two were witnesses that have testified before in several rate cases, and one witness, Fred Ford, is President of TABS Associates, one of the largest of the presort service bureaus that have sprung up around the country since 1956.

One expert, Richard Bentley, had been a staff economist with the Postal Rate Commission. He testified to the cost savings provided by presorting. The Postal Service collects costs by categories: they have mail handlers, and supervision, and some direct non-labor costs. He looked at the cost of handling presorted

Investor-owned electric utilities mail about 800 million pieces of mail a year.

letters on a per piece basis, and the cost is about 6 or 8 cents less per piece than for regular first-class mail. Now the question is how much of that difference is due to random factors. Does presorted mail go shorter distances, for example, which would mean that there was less cost but it would have nothing to do with the kind of mail it is? Bentley looked at these various factors and concluded that for comparable letter-shaped mail, with comparable origin, destination, etc., presorting mail and delivering it to the Postal Service saves 5.6 cents per piece. To be conservative, he recommended a discount of 4.5 cents, and we got 4.

EP: Who was the other expert witness?

Threadgill: The other expert witness was Charles Larson, an economist and former staff engineer with EEI who testified to the characteristics of bulk first-class mail—what kind of mail it is and how sensitive it is to price. He tried to persuade the Postal Rate Commission/Postal Service to treat large-volume first-class mail as a sub-class, and to base the rate for presorted mail on its attributable cost, in our case 8 or 9 cents plus overhead. Now, we didn't win that point. They said, "No, you don't have enough distinguishing characteristics to be a sub-class," and held that presorted mail is a rate category.

We said the Postal Service's costs for our mail should be viewed on a stand-alone basis. They said you don't look at costs for a rate category on a stand-

UNIPHOTO

alone basis—you have to look at what cost is avoided by presorting. It's a conceptual difference. The Postal Service says when a mailer brings presorted mail to the Postal Service in the trays, all labeled and metered so they don't have to do that—most of the savings result not from presorting but from other preparation, and the Postal Service thanks many mailers would do that other preparation anyway to expedite their mail. So they calculate that presorting saves less than 3 cents. Of course, they're looking at a totally different package of activities to quantify their savings.

Still, although we didn't win the sub-class status, we were able to persuade the Postal Commission not to adopt the very narrow cost-avoidance analysis used by the Postal Service.

EP: How much are EEI members spending on mailing their bills annually?
Threadgill: We figure the investor-owned electric utilities, including combination companies, mail about 800 million pieces a year. At 17 cents, the current bulk rate, that's close to $140 million.

EP: Does the ruling mean that postal affairs will be quiet for the next 3 years?
Threadgill: Not quite. We still need to resolve the sub-class issue and the impact of ZIP + 4. As the Postal Service automates the sorting of incoming mail with ZIP + 4 codes, the cost avoided by presorting alone will decline and the presort discount will be jeopardized. Large volume mailers are not adopting ZIP + 4. The 6-billion-piece presort bureau industry will not convert without a much greater discount than one-half cent, which is what using ZIP + 4 would give them. Utilities, for example, can save more by converting the 85 percent of their bills that can be converted to carrier route sorting, which would save them one cent, than by going to ZIP + 4. Other large volume mailers understand that adopting ZIP + 4 will undermine presort discounts unless we have sub-class status. This issue will have to be settled before the next postage rate case.

Editor's Note: Although the Board of Governors heard the Postal Rate Commission's recommendation on the proposed rate increase at its November 1984 meeting, no decision was made. At press time, the matter was scheduled to be considered and resolved at the Board of Governor's December 11 closed-door meeting.

ORGANIZED OUTREACH

Part of the nation's history since Columbus, Hispanics today represent a growing segment of the population that cannot be ignored.

By Mark Reynolds

Mark Reynolds is a freelance writer based in Washington, D.C.

"Aqui se habla espanol"—this simple phrase posted in shop windows across the country signals a major shift in American demographics and represents a crucial challenge to American business and industry. A sign in the window inviting Spanish-speaking customers is an important step for businesses toward meeting the challenge to attract and serve the nation's Hispanic community. Larger businesses and industries, such as the electric utility industry, require a greater public information effort, though the spirit of the sign in the window remains the same. An awareness of the needs and objectives of the Hispanic population and an organized program of outreach to the Hispanic community are becoming vital concerns.

Consider the statistics. There are between 20 and 24 million Hispanic-Americans. Hispanics represent the single largest immigration group in the United States and the fastest growing minority. The United States is already the fourth-largest Spanish-speaking nation in the western hemisphere and should become the third-largest by 1990. In the group of Americans 18 to 20, the proportion of Spanish-speaking people will grow from 6.5 percent in 1980 to an estimated 21.7 percent in 1990. Though the southwest Sunbelt and the major urban centers of the eastern corridor continue to hold the greatest concentrations of Hispanics, there are sizeable and growing Hispanic communities throughout the Midwest and the Pacific Northwest. By the year 2000, Hispanics well may be America's largest minority, and the Baby Boom generation may have been the last American generation to grow up without a large and influential Spanish minority. What these statistics might mean to American businesses can be summed up in dollars and cents: today's Hispanic population has an annual income conservatively estimated at over $68 billion.

New Self Awareness

The word *Hispanic* is a recent semantic invention for easy identification of Americans of Spanish descent. However, Hispanics themselves have been part of America's history from its earliest antecedents—ever since the king and queen of Spain agreed to bank-roll Columbus' maiden voyage. The recent emphasis on this segment of the population is not merely a reflection of their growing numbers, but a result of increased self-awareness among Hispanics themselves. Like the Harlem Renaissance of the Twenties and Thirties, the Hispanic Renaissance reflects a renewed appreciation of Spanish culture and traditions and a concerted effort on the part of the community to sustain and nurture Hispanic heritage. Increased self-awareness for blacks led to black pride and the crusade for civil rights, and the same pattern has held true for Hispanics. Bilingual education, equal job opportunities, economic stability—these are among a number of political and social issues of paramount importance to the Hispanic community. Hispanic leaders across the country have recognized the potential economic and political clout that effective organization can bring to their communities. Politicians in many areas of the country now court the Spanish vote as a necessity for winning elections, and Hispanics themselves are being elected in increasing numbers for both state and national office.

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By the year 2000, Hispanics well may be America's largest minority.

MINORITY BUSINESS DEVELOPMENT

As defined by federal regulation, a minority business is one owned at least 51 percent by minority group members. Beyond this simple definition, the services provided by minority vendors are as diverse as the needs of electric utilities. The growth of minority business within the industry reflects not only the quality and reliability of these companies, but also aggressive "Fair Share" practices on the part of utilities.

Utilities are supporting minority business for a number of reasons: to be more socially responsible, to expand their lists of qualified suppliers, to enhance their image among minority groups, to comply with present federal legislation, and to involve minority businesses in the free enterprise system without the need for government intervention. Whatever their motivations, electric utilities are now actively seeking out minority vendors and establishing highly successful minority purchasing programs.

Electric companies usually have at least three different ways of awarding contracts to minority businesses. Minority firms that are capable of competing with majority firms are put on the regular bidders list. Some minority firms are listed for "set-aside" bidding, which allows for competitive bidding by minority firms only. Noncompetitive set-aside orders often are tailored to individual vendors and allocated for training purposes to help minority companies gain the necessary experience and knowledge to move into new areas. Such special programs should develop minority suppliers to the point that they can compete successfully with majority firms. The ultimate goal is to integrate minority firms into the normal procurement process.

Many electric companies are conducting very active outreach efforts to interest minority firms in working with them. One aspect of such programs includes sponsoring local trade shows or opportunity fairs. Niagara Mohawk Power Company, for example, cosponsored a job opportunity fair with over 90 minority firms and 300 purchasing agents in attendance. Such events provide a unique opportunity for minority vendors and purchasing representatives to establish new business relationships or strengthen existing ones.

In addition, many utilities conduct well-funded publicity campaigns using radio and TV commercials, newspaper ads, and insert flyers to help overcome any minority vendor reluctance to approach them for business. New York's Consolidated Edison Company has had one of the most successful minority vendor programs for over a decade. Among other public information techniques, Consolidated Edison has printed posters—many in the language of the target audience—aimed at reassuring minority business enterprises that might be afraid of big company bidding, billing and payment procedures, and, in effect, thus keeping themselves out of the program.

Some utilities are also introducing minority firms to other companies that have existing electric company contracts so that sub-contracting arrangements can be worked out. At Philadelphia Electric Company's Limerick construction site, five different minority vendors are now supplying items to the prime contractor. Due to the diligence of the utility's minority vendor personnel, the net result has been an increase from essentially no minority business at Limerick to over $200,000 in business to minority firms in 1983.

Electric utilities depend on the communities they serve, and minority businesses are a part of most communities in the United States—a fast growing part. When utilities look at their own best interests, they understand that stimulating and encouraging the growth of *all* firms in their service areas means supporting and developing local minority business enterprises. Developing minority business is good business.

BEST AVAILABLE COPY

Over the last ten years, greater attention has gone to informing and educating customers . . .

A cynical observer might label the new awareness of Hispanics by politicians and business sheer self-interest. However, Domingo Reyes, a Washington-based Hispanic specialist, disagrees. He argues that cultivating a social consciousness is good business, and that the end result is a "trade off" that serves the best interests of all the parties involved. "Historically, Hispanics have been invisible, ignored by both industry and politicians as too small and problematic a group to consider. Today, the growing Spanish minority is too large, and in some places too clamorous, to ignore. Businesses are run and politicians elected to serve the public, and success in either field comes from the ability to put oneself in another person's situation, to imagine how he feels, understand how he thinks, and predict his needs. The result may be a marketing strategy or campaign platform that increases revenues or wins votes, but also, and more importantly, there will be a heightened sensitivity to the concerns of the minority and more effective channels of communication and cooperation between minorities and the mainstream." Reyes adds, "There is nothing new about this strategy: it has been tested in the American marketplace for 200 years."

A Unique Responsibility

Because electric utilities hold a key position within the American marketplace, they have a unique responsibility to confront the challenge of serving their Hispanic customers and, moreover, to translate that challenge into an opportunity. There is a clear mandate for greater action toward meeting this responsibility. Hispanics make up a significant portion of the industry's customer base, an increasingly important segment both in terms of numbers as Hispanics come to be the nation's largest minority and in terms of dollars of revenue as Hispanics move up the economic scale and use more and more electricity for more and more things.

Utilities provide a service, and they depend on the customers they serve. Over the last ten years, greater attention has gone to informing and educating customers about the nature of the electric utility industry as a means of enlisting their support for efforts such as conservation and alternative energy that the industry believes to be in the public interest. Little of that attention has been focused on the Hispanic community in particular, and as a result, this segment of the population tends to take a dim view of the industry at large.

Carlota Maduro, Director of Community Relations for the Consolidated Edison Company of New York, recalls that, before the company undertook a comprehensive program aimed at its almost two million Hispanic customers, the utility had a severe image problem among this group. "The Hispanic community viewed the utility as monolithic and cold, a distant and disturbing entity with no concern for the individual or the community." Increased numbers of bilingual company representatives, active field service centers in the Hispanic communities throughout New York, information pamphlets in Spanish, and advertisements in the Hispanic media—these and a variety of other projects have successfully changed the image of the utility within the Hispanic community.

A study of Hispanic attitudes toward electric utilities made several years ago found things somewhat less bleak, but no less discouraging. According to the study, the local electric utility essentially had no identity for the Hispanics in its service area. Hispanics perceived the existence of the utility only when the bill had to be paid, not as a part of their day-to-day activities. The Hispanic community at large is not aware of the important connections among energy supply, jobs, economic growth, and productivity. These are crucial issues to the electric utility industry as well as to the national economy; making every segment of the population aware of them should be a major objective of every company.

Economic Plight

Lower-income members of the Hispanic community pose, perhaps, the greatest problems and the greatest responsibility for electric utilities. Barriers of language and culture, as well as the effects of derogatory stereotypes that traditionally curb the mobility of minorities, have tended to detach and alienate Hispanics from the general population.

In the face of rising electric

rates, companies have made a concerted effort to educate customers about conservation and energy efficiency. All too often, however, those customers who most need such information are least likely to have easy access to it. An elderly, Spanish-speaking citizen—one who lives in a ghetto with no landlord support and the meagerest of incomes—would realize the benefits of energy conservation much more so than the average customer. Such a person might regularly face a choice between heat and food.

There are things that local electric companies can do to ease the plight of such customers. A number of companies have established field offices within Hispanic communities and staffed them with professionals fluent in Spanish. David Barron of Southern California Edison describes these centers as "unusually active, with a greater percentage of customers who prefer to pay their bills in cash and a steady stream of concerned individuals coming in to ask questions or seek help." El Paso Electric Company's Star Services program includes special attention to the needs of lower-income Hispanic customers, with bilingual employees serving as liaisons between social agencies and customers in need of financial assistance to meet their electric bills.

Employment Objectives

Jobs are critical for the Hispanic community, which suffers under an unemployment rate well above that of the general population. Reyes maintains that industry efforts in this area must "go well beyond the usual mandates of equal opportunity." El Paso Electric Company provides a model of what an aggressive affirmative action program can achieve. According to Administrative Vice President Charles Mais, the number of Hispanic employees at El Paso has risen from 35 to 52 percent over the last ten years—the direct result, Mais says, of company philosophy fostered by President E. R. Wall. Mais estimates that over 25 percent of El Paso's managers and supervisors are Hispanic, as well as two of six vice-presidents and a member of the Board of Directors.

Arizona Public Service achieved another first when it organized a training program geared primarily for Hispanics. Along with a local affiliate of the national Council of La Raza, a major Hispanic organization, the Arizona utility reorganized and implemented a multi-based, six-discipline training program to attract qualified Hispanic applicants from throughout the area.

Supporting minority businesses is another method of helping to improve the economic status of the Hispanic community. Most electric utilities nationwide have set aside a fair market share of their total expenditures for goods and services to go to minority businesses. As a result, a number of minority businesses that have never done business with electric companies are now providing goods and services to the industry. New firms that had not even existed as recently as three years ago are using electric company contracts as a core part of their operations while they ex-

A bajo costo
A ningún costo
Ideas que ahorran energía
Con Edison
Con Edison

Ed Castle

Part of keeping the Hispanic community informed entails translating information and educational materials into Spanish.

. . . Hispanic advisors can provide a more complete personal perception of the Hispanic Population.

pand into other industries. Some of these minority companies have been growing at an extremely rapid pace based—to a large extent—on the steady and reliable business electric companies have been offering them. (See Sidebar: Minority Business Development.)

Maduro, speaking for Consolidated Edison, says that outreach programs to minority vendors "not only enhance opportunities for Hispanics and other minorities and put much-needed money into their communities, but also assure utilities of a larger and more qualified pool of potential applicants for company contracts."

Southern California Edison works closely with the Mexican-American Opportunity Foundation that recruits, screens, and prepares applicants for specific jobs within the utility. Robert Hine, Manager of the Equal Opportunity Department, views this hiring effort as "a major factor in Southern California Edison's outreach program to the Hispanic community," and he credits such programs with contributing "the goodwill that our company wants to maintain with the Hispanic community."

Winning Goodwill

Companies can win such goodwill in any number of ways, but the most effective outreach programs usually share four fundamental imperatives.

Know the demographics in your service area. In places such as El Paso—where a past president of the Chamber of Commerce, two recent mayors, and 64 percent of the population are Hispanic—the Spanish-speaking presence and influence are obvious. In other areas, Hispanics may not be so numerous or highly visible. For example, Laura Reyes Kopec, an attorney for the Detroit Edison Company, argues that Michigan's Hispanic community has failed to achieve a political and economic strength in proportion to its size. "Gerrymandering, in the recent reapportionment, has segmented the communities in such a way that Hispanics have not been able to exercise any political clout or get their candidates elected. A sizeable Hispanic community exists here, though they have achieved little effective visibility."

A canvas of customers within any service area could turn up surprising statistics, as could a canvas of the company itself. Locating Hispanics within a utility and enlisting their involvement in the company's outreach efforts provides a built-in liaison with the Hispanic community at large.

Organize an advisory group to include a cross-section of the Hispanic community. Building effective coalitions with the Hispanic community is one of the important first steps in an effective outreach program. Inviting Hispanic representatives to sit down and talk about the concerns of their constituents almost automatically transforms the image of the electric utility industry from part of the Hispanics' problems to part of their solution. Involving political, social, and civic leaders from the Hispanic community in the policy-making process of an electric utility gives them a clearer and more meaningful picture of how and why decisions are made. When the community understands those decisions and what led up to them, Hispanics are much more likely to support those decisions.

No company can serve its customers without a genuine understanding of their needs, and input from Hispanic advisors can provide a more complete and personal perception of the Hispanic population. The advisory group should represent the variety of nationalities—Cuban, Mexican, Puerto Rican, South American—and the diverse range of interests—politics, social services, businesses, the arts—present in the local Hispanic community. The broader the spectrum of the group, the more effective the coalition.

Keep the Hispanic community informed. Translating informational and educational materials into Spanish, securing bilingual company representatives, setting up field offices within the Hispanic community—all such efforts not only earn the goodwill of the Spanish-speaking community, but also ensure that the utility gets its message across to customers in the clearest and most correct manner. According to Maduro, Consolidated Edison of New York has public information or advertising contact with two major daily Hispanic newspapers, four biweekly papers, a monthly magazine, two Spanish television stations, and four

. . . utility support for scholarship and training programs is a vital aspect of community service.

radio stations. "All of this represents a comprehensive policy to keep in touch with our Spanish-speaking customers, to sustain and improve a relationship that serves both customer and company."

Translating company information and advertising into Spanish is the most obvious and immediate solution for reaching the Hispanic Community. Similarly, companies generally have community service programs already in place, and expanding these programs to include Hispanics specifically offers a convenient and effective first step in serving this segment of the population. Consolidated Edison's Save-a-Watt program provides a case in point. Offering advice and education about conservation techniques for residential customers, the program was unknown in the Hispanic Community until the program materials were translated into Spanish and bilingual representatives were assigned to work in the Hispanic community.

Company efforts to bring its message to the Hispanic community could be served even further by bringing members of the community to the company itself. Tours of utility facilities provide a clearer and more objective picture of an electric company's day-to-day operations, as well as a more thorough understanding of its role throughout the community. Baltimore Gas and Electric organized such a tour of the utility's Calvert Cliffs nuclear facility. The tour succeeded not only in explaining how a nuclear power plant operates, but, on a larger scale, in fostering an appreciation of the issues and concerns that surround and complicate the nuclear option for electric utilities nationwide.

Get involved in the Hispanic community. Jose Cox, who handles Hispanic relations for the Philadelphia Electric Company, maintains that "the personal touch is paramount when dealing with the Hispanic community." Working through a network of about 50 individuals from the Hispanic community in his service area, Cox stays abreast of the concerns and issues of particular interest to this group. His efforts are not limited to energy and electricity issues, but include whatever social, economic, or political questions the Hispanic community might be facing.

Philadelphia Electric maintains a bilingual customer-service telephone line daily, but Cox himself is also out in the community representing the company at various church, civic, and school meetings. He also makes himself available to deal with particular problems when individual needs arise.

"Business through phone calls and correspondence isn't enough," Cox explains. "A company needs someone with the flexibility to sit down with the customers and deal with their special and individual problems. This is true for all customers, but especially for minorities who might feel alienated from the start. An effort directed at these customers makes the utility accessible to them in a new and productive way."

Because education is a major goal of the Hispanic community and a means of improving its social and economic standing, utility support for scholarship and training programs is a vital aspect of community service. Similarly, efforts to support and encourage Hispanic endeavors in the arts or civic projects reveals an appreciation on the part of the industry that ethnic pride and cultural traditions should be nurtured. The active involvement of utilities at Hispanic festivals and trade fairs, on both the community and national levels, reveals a similar interest: the quality of life within the Hispanic community. When a utility makes its presence felt and its concern known throughout the community—in schools, churches, social organizations, and homes—it becomes a part of that community and earns its support.

An effective outreach program can go far beyond the particular audience that the program is designed to serve. Efforts can provide a new and effective tool for marketing the product, recruiting capable employees, and serving *all* customers. In meeting the needs of our special audience, the industry needs to show its intent and prove its ability to serve every customer. This effort is not bound by issues, nor can it be limited by a particular mind set. The capability to identify a need and go after a solution will continue to be the determining factor for the future.

ETHNIC STEREOTYPING

Ethnic stereotyping is nothing new, and like other minorities, Hispanics have suffered from derogatory depictions of themselves in the popular press, in movies, and on television. Early westerns, for example, characterized Spanish-Americans as slow, lazy peasants or bandits—in contrast to images of the hardworking Anglo-Saxon rancher or the town sheriff in the white hat. The focus of today's media on America's so-called "illegal immigrants" threatens to create another negative stereotype of the Hispanic—one that could imperil future employment opportunities for a group already suffering from double-digit unemployment rates.

The Simpson-Mazzoli Bill passed both House and Senate last year before stalling in committee, and chances are good that it will be introduced again during the next Congressional session. The bill would impose sanctions on any employer who hires illegal or undocumented aliens. According to Charles Kamasaki, Director of Policy Analysis for the National Council of La Raza, such legislation could have potentially devastating implications for the Hispanic community. "In a tight job market like today's, any small factor that influences employee selection is of major consequence," Kamasaki says.

The concern over employer sanctions is essentially two-fold. First, Kamasaki says, such sanctions provide "a convenient pretext for those who, for whatever reasons, *want* to discriminate." A law of this kind would give such people "an easy excuse to reject applicants for all kinds of flimsy reasons." An employer could argue, for example, that he or she suspected a social security card of being forged, and the chances of convicting such employers of job discrimination would be very slim. Secondly, even employers not predisposed to discriminate might choose to "play it safe" by avoiding applicants who fit their ideas of "immigrant stereotypes." Kamasaki explains that any number of variables (dress, skin color, accent, etc.) could determine such decisions.

"Job discrimination could result from a wide variety of scenarios given such legislation," Kamasaki argues. "There are a surprising number of people, for example, who don't understand the difference between immigrants and American citizens of ethnic origin.

Discrimination can take a variety of forms. For instance, an employer could make a rational decision to limit the hiring of minority employees, fearing that a large percentage of minority workers could trigger a raid by the national immigration service. (Such raids are becoming increasingly common in some parts of the country.) "No employer, not even an honest one, wants to invite such action," Kamasaki explains. "By limiting the percentage of minorities in the workforce, an employer reduces the chances of such government intervention." On a less rational basis, employers might scrutinize applicants who fit immigrant stereotypes more harshly than other applicants.

According to Kamasaki, Americans in general have never been accepting of immigrants, and U.S. immigration policies have been characterized consistently "by a not-so-subtle racism." Policies set early in the century and still enforced established quotas that favored Europeans and discouraged Asians and Latin Americans. The proponents of such legislation argued the quotas on racial grounds. The recent concern over immigration coincides with an unstable economic scenario—a coincidence that does not surprise Kamasaki or other analysts.

There is little evidence to support concern that illegal aliens are draining the national economy or taking jobs away from American citizens. "Studies from any number of sources attest to the fact that immigrant groups, legal or illegal, tend to under-utilize social service programs," Kamasaki explains. "For example, of Hispanics eligible for housing assistance, the percentage actually taking advantage of this assistance is far lower than those of other minority groups, such as blacks or women.

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REVIEWS

FINANCIAL REVIEW

EARNINGS PER SHARE UP 11.5 PERCENT; OPERATING REVENUES AT $28 BILLION IN SECOND QUARTER

A 13.0 percent increase in electric operating revenues during the second quarter of 1984 drove earnings for the period to $0.68 per share, an 11.5 percent increase over the $0.61 registered during the second quarter of 1983. This year's economic recovery and last year's cooler-than-normal second quarter account for the increased sales and the attendant revenue growth.

For the quarter ended June 30, 1984, electric operating revenues were $28.0 billion compared to $24.8 billion for the quarter ended June 30, 1983. For the twelve months ended June 30, 1984, electric operating revenues were $114.8 billion compared to $102.6 billion one year earlier, an increase of 11.9 percent. For the twelve months ended June 30, 1984, earnings per share increased 17.2 percent to $3.21 from $2.74 one year earlier. The return on average common equity increased to 15.3 percent for the year ended June 30, 1984, from 15.1 percent for the year ended March 31, 1984.

Viewed against comparable periods for the year earlier, electric operating expenses increased at a slightly slower rate than electric operating revenues during both the quarter and the year ended June 30, 1984, despite the fact that fuel expenses increased by 11.5 percent during the second quarter of 1984, the greatest quarter-to-comparable-quarter increase since the fourth quarter of 1981. For the twelve months ended June 30, 1984, fuel expenses increased 6.4 percent to $37.1 billion. Still, for the twelve months ended June 30, 1984, the electric operating ratio (electric operating expenses to electric operating revenues) declined to 80.9 percent from 81.7 percent. For the second quarter of 1984, the electric operating ratio was 82.0 percent, down from 82.2 percent in the second quarter of 1983.

AFUDC, CWIP Slow

Total allowance for funds used during construction (AFUDC) increased only 2.4 percent during the second quarter of 1984, compared to the second quarter of 1983, and accounted for 58.7 percent of the net income available for common stock shareholders compared to 68.9 percent one year earlier. For the twelve months ended June 30, 1984, AFUDC increased 9.0 percent, accounting for 50.8 percent of the net income available for common, down from 59.4 percent one year earlier.

The low rate of increase in total AFUDC is attributable to several factors, including the completion of several large construction projects. In fact, construction work in progress (CWIP) increased only 5.4 percent from June 30, 1983, to June 30, 1984, compared to an 18.4 percent increase from year-end 1981 to year-end 1982, while plant in service (net utility plant less construction work in progress) increased 10.3 percent to $203 billion.

Interest Coverages Improve

In response to improved earnings and declining interest rates, pre-tax interest coverages—the ratio of operating income, including income taxes and AFUDC, to debt charges—continued to improve. During the three months ended June 30, 1984, interest coverage was 2.81 times compared to 2.63 times during the second quarter of 1983. During the twelve months ended June 30, 1984, interest coverage was 3.16 times compared to 2.79 times one year earlier.

The improved interest coverage averages disguise the continuing financial difficulties faced by several companies. Through the second quarter of 1984, Moody's increased its ratings on the senior debt securities of 13 electric utilities and lowered the ratings on 24. However, during the 1984 third quarter, Moody's reported 13 upgradings and only 2 downgradings—further indication that the industry's financial condition as a whole is improving.

Table 1

Investor-Owned Electric Utility Industry Statement of Income
For periods ending June 30, 1984 and 1983 (Unaudited) (Millions of Dollars)

	Quarter Ending June 30,			Year Ending June 30,		
	1984	1983	% Change	1984	1983	% Change
Total Electric Operating Revenues	$27,998	$24,772	13.0	$114,798	$102,557	11.9
Electric Operating Expenses						
Fuel	$8,948	$8,026	11.5	$37,074	$34,835	6.4
Other Operation & Maintenance	7,319	6,739	8.6	27,836	25,753	8.1
Depreciation & Amortization	2,280	2,004	13.8	8,693	7,829	11.0
Taxes Other Than Income Taxes	2,078	1,865	11.4	8,245	7,400	11.4
Income Taxes (Federal & Other)	564	121	366.1	4,057	2,844	42.7
Provision for Deferred Income Taxes	1,235	1,177	4.9	4,956	3,072	61.3
Investment Tax Credit Adjustment, Net	535	436	22.7	2,022	2,060	(1.8)
Total Electric Operating Expenses	$22,959	$20,368	12.7	$92,883	$83,793	10.9
Electric Operating Income	$5,039	$4,404	14.4	$21,915	$18,764	16.8
Other Utility Operating Income	326	282	15.6	1,438	1,040	38.3
Total Utility Operating Income	$5,365	$4,686	14.5	$23,353	$19,804	17.9
Other Income	468	379	23.5	1,964	1,434	37.0
Allowance for Other Funds Used During Construction	1,281	1,254	2.2	5,165	4,599	12.3
Total Income Before Interest Charges	$7,114	$6,319	12.6	$30,482	$25,837	18.0
Interest on Long Term Debt	$3,368	$3,081	9.3	13,031	$11,987	8.7
Other Interest Expenses & Charges	283	289	(2.1)	1,140	1,252	(9.0)
Allowance for Borrowed Funds Used During Construction	(817)	(795)	2.8	(3,211)	(3,083)	4.2
Net Interest Expenses & Charges	$2,834	$2,575	10.1	$10,960	$10,156	7.9
Net Income Before Extraordinary Items	$4,280	$3,744	14.3	$19,522	$15,681	24.5
Extraordinary Items	20	(74)	NM	(164)	(68)	141.2
Net Income	$4,300	$3,670	17.2	$19,358	$15,613	24.0
Preferred Dividends Declared	727	694	4.8	2,869	2,675	7.3
Net Income Available for Common	$3,573	$2,976	20.1	$16,489	$12,938	27.5
Common Dividends Declared	2,695	2,520	6.9	10,698	9,548	12.0
Retained Earnings	$878	$456	92.5	$5,791	$3,390	70.8
Avg. Shares Outstanding	5,265	4,894	7.6	$5,132	$4,728	8.5
Earnings Per Share*	$0.68	$0.61	11.5	$3.21	$2.74	17.2
Common Dividends Per Share*	$0.51	$0.51	0.0	$2.08	$2.02	3.0

*Based on average shares outstanding as reported to EEI by survey respondents and adjusted for stock splits.
NOTE: Revenues are adjusted for intra-industry sales for resale of electricity.
NM: Not Meaningful

Table 2

Investor-Owned Electric Utility Industry Balance Sheet
As of June 30, 1984 and 1983 (Unaudited) (Millions of Dollars)

Assets	**1984**	**1983**	**% Change**
Utility Plant*			
Utility Plant (Including Nuclear Fuel)	$289,791	$262,060	10.6
Less Accumulated Depreciation	81,819	73,997	10.6
Less Property-Related Accumulated Deferred Income Taxes	4,606	3,641	26.5
Total	$203,366	$184,422	10.3
Construction Work in Progress	101,282	96,128	5.4
Net Utility Plant	$304,648	$280,550	8.6
Investments	7,209	6,133	17.5
Current Assets	33,700	30,943	8.9
Deferred Debits	13,523	8,024	68.5
Total Assets	$359,080	$325,650	10.3
Capitalization & Liabilities			
Capitalization			
Common Stock	$76,732	$70,526	8.8
Retained Earnings	38,121	32,370	17.8
Preferred Stock	31,823	30,661	3.8
Long-Term Debt	136,930	126,757	8.0
Total Capitalization	$283,606	$260,314	8.9
Current Liabilities			
Short-Term Debt	$6,126	$5,940	3.1
Long-Term Debt Due Currently	3,878	3,822	1.5
Other Current Liabilities	25,105	22,270	12.7
Total Current Liabilities	$35,109	$32,032	9.6
Deferred Credits			
Accumulated Deferred Income Taxes	$20,379	$16,459	23.8
Accumulated Deferred Investment Tax Credits	13,223	11,146	18.6
Other Deferred Credits	6,763	5,699	18.7
Total Deferred Credits	$40,365	$33,304	21.2
Total Capitalization & Liabilities	$359,080	$325,650	10.3

*Includes other utility plant of combination gas and electric companies.

Retained Earnings Improve

The growth in additions to retained earnings over the year ended June 30, 1984, resulted primarily from improved earnings performance. During the twelve months ended June 30, 1984, annual additions to retained earnings increased 70.8 percent over the year ended June 30, 1983. As a result, accumulated retained earnings continued a favorable trend that began in the third quarter of 1983 whereby they became the fastest growing element in the industry's capitalization structure. At June 30, 1984, accumulated retained earnings totalled $38.1 billion, up 17.8 percent from one year earlier and accounting for 13.4 percent of the industry's total capitalization, a full percentage point higher than a year before.

Preferred Stock, Long-term Debt Decrease as Percent of Total Capitalization

Preferred stock, which increased 3.8 percent to $31.8 billion from June 30, 1983, to June 30, 1984, dropped to 11.2 percent of total capitalization from 11.8 percent. Long-term debt increased 8.0 percent to $136.9 billion, but declined to 48.3 percent of total capitalization from 48.7 percent one year earlier. Common stock remained at 27.1 percent of capitalization while increasing 8.8 percent to $76.7 billion. The average number of common equity shares outstanding during the year ended June 30, 1984, increased 8.5 percent to 5.1 billion shares. However, for the quarter ended June 30, 1984, shares outstanding increased 7.6 percent, indicating a slowing in the rate of issuance of new equity.

Return on Common 15.3 Percent

The return on average common equity for the twelve months ended June 30, 1984, was 15.3 percent. Edison Electric Institute has estimated that the average return granted by state commissions in rate cases decided in the second quarter was 14.9 percent, down from the 15.1 percent averaged in cases decided in the previous quarter. The lower return allowed in cases decided in the second quarter reflects recently declining interest rates. Given the increased sales, moderating fuel costs, and the gain in earnings from non-utility operations, the industry's return on earnings during the one-year period was somewhat higher than the allowed return in cases decided in the last quarter of the year.

Tables 1 and 2 are based on unaudited reports received from electric utilities. The utilities account for about 95 percent of the industry's revenue from sales to ultimate customers and 94 percent of the industry's total assets. The data was expanded to represent the entire industry. ▰

Contributed by the Finance Department of Edison Electric Institute.

TECHNOLOGY REVIEW

LIGHTING THE FUTURE

Lighting is the manifestation of electricity.

Other energy sources can heat our buildings, cook our food, propel our vehicles, and run our machinery, but nothing but electricity can produce the light that people command with the flip of the switch.

"If you are like most people, you probably take lighting for granted," explains Steve Pertusiello, Project Manager for lighting research at the Electric Power Research Institute (EPRI) in Palo Alto, California. "However, lighting—society's earliest and most basic use of electricity—has been undergoing major changes in recent years."

Most of the advances are designed either to reduce energy costs or to improve productivity in the workplace, Pertusiello adds.

In the United States, lighting uses some 420 billion kilowatt-hours—about 20 percent—of the electricity generated each year. In the commercial sector, lighting can account for as much as 50 percent of a building's load. This percentage can be boosted even further by ventilating and air conditioning systems used to remove excess heat caused by lighting.

With an eye on reducing energy demands caused by lighting, EPRI's Energy Management and Utilization Division is concentrating its research on lighting technology. Several projects are currently underway, one of the most important of which is scheduled for completion in 1985. The project will culminate in the publication of a handbook for utility representatives that addresses commercial and industrial lighting applications. The handbook will cover changes in today's lighting load, lighting end-use characteristics of commercial buildings, and new lighting technologies and evaluation methods.

EPRI is also developing control strategies in photo-sensors to dim fluorescent lights in daylight. Such strategies, quite different from the traditional ones useful in older buildings, will help conserve energy in the growing number of new buildings that incorporate architectural features to optimize the availability of sunlight.

Other EPRI lighting projects entail:

- Addressing the visual effectiveness of daylighting a building;
- Evaluating the energy-conserving potential of solid state ballasts for fluorescent and high-intensity discharge lamps;
- Reviewing and testing design data and methods for analyzing the interaction of lighting and HVAC systems; and
- Evaluating the photometric and electric characteristics of fluorescent fixtures retrofitted with a mirror film, such as silver or aluminum.

Other recent developments in the field of lighting have emphasized how it effects productivity in the workplace. Traditional designs using ceiling illumination are giving way to designs that put the lighting where workers need it. Called "task lighting," the approach also defines the amount of light necessary for a particular task.

For example, general overhead office lighting may no longer be efficient when horizontal tasks like reading a report placed on a desktop are replaced by vertical tasks like reading the same report as it scrolls across a computer screen.

All of these projects hold promise for reducing business' lighting costs, and that's good news for many electric utilities because lower lighting demand can shave peak load, reducing their need to build costly generating plants.

Specific task lighting that illuminates highly visual jobs, such as silicon wafer fabrication, also may displace general industrial fluorescent lighting.

"Consumers need to suit lighting to the task," stresses EPRI's Pertusiello. For precision assembly of small parts, high-technology industries require high lighting levels and directional lighting quite different from traditional room illumination. Robot-manned production lines, for example, may require no lighting.

Other advancements are being made in lighting fixtures and lamps, the most basic lighting equipment. For instance, high intensity discharge (HID) lamps, about six times more efficient than incandescent lamps, are edging their way into commercial office markets.

Because of their poor color quality, HID lamps of 450–1000 watts traditionally have been relegated to lighting large outdoor areas such as streets and parking lots. But designs for HID lamps of 150 watts or less have been developed with proper color correction for indoor use and are now accepted by customers.

Advances also will change residential lighting in the future. Incandescent lamps that deliver more light per watt than conventional incandescents already have been developed as the result of improved filaments and bulbs. However, because lighting accounts for only about 10 percent of a residential energy bill, lighting advances in this sector have been and will continue to be made more slowly than in the commercial and industrial sectors. ▰

Contributed by the Information and Publishing Services Department of Edison Electric Institute.

R E V I E W S

BOOK REVIEW

SELECTED AUDIOVISUAL MATERIALS PRODUCED BY THE UNITED STATES GOVERNMENT

General Services Administration,
National Archives and Records Service,
and National Audio-Visual Center, 1984
Washington, D.C. 186 pp.

By Hal Dunham

There's an old saw about the dictionary being interesting reading, but short on plot. The same might be said about the U.S. government's 1984 catalogue of audiovisual materials, with one difference. For those who care to follow up, this 186-page volume could have a happy ending.

"Hollywood on the Potomac," is a nickname often given the nation's capital, for reasons other than its sometimes glamorous embassy receptions and wonderland politics. Washington, D.C., happens to be one of the world's busiest audiovisual production centers.

The networks all have studios here. Diversification of the area's economy has brought in many smokeless industries that produce films, video and slide programs for purposes ranging from employee training and public information to sales pitches for their products. The area is headquarters for Marriott, MCI, Comsat, Public Broadcasting, Fairchild-Hiller, Martin-Marietta, and other companies. The U.S. Chamber of Commerce has a wonderful $4 million video/teleconferencing facility that is kept busy both with the Chamber's BizNet programming and rentals to other producers.

Washington trade associations produce a multitude of audio-visual programs, from slide shows explaining their industry's views of political issues to sometimes exceptionally good education films. Producers of the real Hollywood product—the entertainment films—find the city attractive, too, and eleven major productions will be filmed here in 1984.

Moreover, the city is host each year to the CINE Showcase, one of the nation's most important gatherings of film folk. During the Council on International Non-theatrical Events three-day show, (December 5-7 this year), winners of foreign film festivals collect their honors from ambassadors of the awarding countries and producers and sponsors of non-theatrical productions receive the CINE Golden Eagle for works judged to be "of excellence." Award of the Golden Eagle makes the films eligible for the Academy Awards and for foreign film festivals, so there is a good deal of prestige associated with it.

But it is the government that provides most of the audio-visual action, as the 3,000 programs listed in this year's catalogue testify.

It was government, not private industry, that took advantage of Edison's technology and produced the first sponsored film for public distribution; that is, a film financed by what today is called a "special interest" and intended for showing before civic groups and other audiences. The year was 1919, and the sponsor was the U.S. Department of Agriculture.

That historical note aside, a few words of caution are necessary about government films in general. Government films do the job for which they were intended. Most often, the purpose is sound and aboveboard. In other cases, propaganda or at least political advantage is the intent.

By way of illustrating propaganda or political advantage, one might have a different impression today of the government epic, "The Battle of Russia," for example, than was intended when it was produced in 1944, and investor-owned utilities might feel testy about the thrust of the Department of Agriculture's production, "Power and the Land," released in 1940 to tell the story of forming an electric cooperative.

There are other cautions about working with government film. Policy dictates the sponsoring department accept the low bid—not always a path to quality or creativity. And for audiovisual departments that want to use footage from government films in their own productions, there is a question of copyright clearance. While the government cannot copyright its own product, many audiovisuals are purchased by government from independent producers and the government's deal may not cover full clearances. The rule is to ask the National AudioVisual Center before using (301/763-1896).

For electric companies, government film libraries are an extensive resource of training programs as well as footage to incorporate in their own programs. A section on "electricity," for example, covers circuits, equipment, motors, and theory—more than 100 programs in all. And there are other sections, as extensive, covering "engineering" (including electrical, energy conservation, solar, wind); "natural resources" (environmental protection, fossil fuels, geothermal); and extensive listings under "environment" and "pollution."

Electric companies will find the most valuable sources of useable audio-visuals, especially film and video tape, are the Corps of Engineers, National Bureau of Standards, National Science Foundation, Environmental Protection Agency, and the National Oceanic and Atmospheric Administration.

There is but one federal law specifically about film. That unique statute decrees that government should caption film for the deaf. Nevertheless, through the years government has been a major film producer, and more than 10,000 titles, not listed in the catalogue, are available from the National AudioVisual Center as are some 22 supplemental catalogues.

Organization of the catalogue is somewhat similar to that employed by EEI's Audio-Visual Exchange Network, except abstracts describing the program are listed alphabetically and are not retrievable on-line by users. Nor does the catalogue cite a contact person within the agencies and departments, or contain the key-word cross-references unique to the EEI Exchange.

Still, there should be a "happy ending" for many who spend some time with this plotless volume. It is a handy resource for training departments, educational services representatives, audio-visual and television departments, speakers bureaus, and others. And it's free from the National AudioVisual Center, National Archives and Records Services, General Services Administration, Information Services/PN, Washington, D.C. 20409.

Hal Dunham is Director of Special Projects and Member Company Services for Edison Electric Institute and a member of the Board of Directors of the Council on International Non-theatrical Events.

REGULATORY REVIEW

UTILITIES PETITION NRC ON WASTE CLASSIFICATION

With the increasing costs of disposing of low-level radioactive wastes, and the possibility of future limitations on access to disposal facilities, there is a growing interest in identifying thresholds of contamination beneath which certain wastes could be disposed of safely without regard to their radioactive content.

For example, the Utility Nuclear Waste Management Group (UNWMG), in conjunction with the Edison Electric Institute (EEI), recently petitioned the Nuclear Regulatory Commission (NRC) for the issuance of a regulation governing the disposal of low-level radioactively contaminated waste oil from nuclear power plants. Essentially, the petition requests that a regulation be issued setting forth radionuclide concentrations below regulatory concern.

"Adoption of such a rule," according to UNMWG Senior Program Scientist Russell Stanford, "Would provide for the more efficient disposal of slightly contaminated waste oil while, at the same time, provide adequate protection for both the environment and public health and safety."

Radioactive waste that is not classified as high-level waste, transuranic waste, spent nuclear fuel, or tailings is classified as low-level waste, and is subject to the NRC's *Licensing Requirements for Land Disposal of Radioactive Waste* (10 CFR Part 61). This rule requires, among other things, that low-level waste be classified according to radionuclide concentration, that it conform with waste form criteria intended to ensure stability, and that it comply with packaging and shipping manifest and disposal facility requirements.

The NRC has recognized that development of standards for disposing of certain categories of waste by less restrictive means would be beneficial from the perspective of both health and safety and utilization of resources. Noting that such standards would reduce disposal and long-term site maintenance costs, conserve disposal facility space for waste with higher activity levels, enhance overall disposal site stability, and tend to reduce ground water migration impacts, the NRC expressed its willingness to accept petitions for rulemaking requesting that certain waste streams be considered below regulatory concern.

In a few narrowly defined instances, the NRC already has authorized disposal of certain types of waste without regard to radioactive materials content. For example, it has authorized the disposal of liquid scintillation media and animal tissue containing no greater than 0.5 microcuries per gram of tritium or carbon-14 without regard to their radioactivity. And, on a case-by-case basis, the NRC has approved alternative methods of disposing of certain very low-level radioactively contaminated waste at several nuclear plants.

Currently, the only generally approved disposal method for low-level radioactively contaminated waste oil involves absorption or solidification of, transportation to, and burial at a licensed disposal facility. "Disposal of waste oil in this manner," according to Stanford, "is costly, inconsistent with efforts to reduce waste volumes, and represents an inefficient use of NRC, licensee and burial site resources."

Under the EEI/UNWMG proposal to the NRC, only waste oil with concentrations that would result in an exposure level greater than one millirem (mrem) per year to the most exposed person would be considered of regulatory concern and would require disposal pursuant to the NRC land disposal rule. Waste oil with lower concentration levels could be disposed of by any of a number of alternative methods including landfill burial and incineration.

The one mrem per year standard was selected on the basis of a detailed study prepared for UNWMG by OTHA, Inc., and, according to Stanford, is consistent with current regulatory policies and practices. The OTHA study utilized data on generation rates and on radionuclide content and concentrations gathered from 15 operating plant sites with 29 separate nuclear power plant units. A number of specific disposal methods were considered in order to determine under what circumstances waste oil could be disposed of without exceeding the one mrem standard. The study concluded that waste oil could be disposed of economically by some or all of the disposal methods considered without exceeding the standard.

Under the proposed rule, limiting gross activity levels for each disposal method would be established such that up to 1000 gallons per year of waste oil could be disposed of at a plant site without exceeding the one mrem limit. In addition, disposal of more than 1000 gallons per year would be allowed under certain conditions, dependent upon the disposal method and the concentration of specific nuclides.

The EEI/UNWMG rulemaking petition recently has been docketed with the NRC, and action on the petition could come as early as 1985.

In addition to the EEI/UNWMG petition on waste oil, the Atomic Industrial Forum and its National Environmental Studies Project have initiated a study of other wastes that might be considered below regulatory concern. Intended to provide technical support for additional rulemaking petitions as well as for individual utilities, the study will cover pressurized water reactor (PWR) clean-up resins; PWR condensate polishing regenerative wastes; make-up water treatment resins; charcoal from HVAC filters; contaminated soils; sanitary sludge; and dry active waste.

Contributed by the Information and Publishing Services Department of Edison Electric Institute.

STATISTICAL REVIEW

NUCLEAR AND COAL EQUAL IN 1983 GENERATING COSTS

Nuclear and coal electrical generating costs were dead even in 1983 at 3.5 cents per kilowatt-hour (kwh) while oil-fired electricity cost 6.4 cents per kwh according to a recent Atomic Industrial Forum (AIF) survey of United States nuclear utilities.

Coal costs remained level in 1983, despite higher fuel prices, due to a sharply higher capacity factor for coal-fired generating plants. The coal capacity factor rose from 54.1 percent in 1982 to 58.6 percent last year, while the comparable nuclear figure declined from 60.5 percent to 59.5 percent.

Meanwhile, nuclear fuel costs rose slightly last year when the Department of Energy began collection of the one mil (0.1¢) per kwh user charge under provisions of the Nuclear Waste Policy Act. The surcharge will finance the disposal of high-level civilian nuclear waste.

The AIF survey showed marked improvement over the previous year in the forced outage rate for nuclear power plants, which fell from 12.2 percent to 10.1 percent. However, there was a simultaneous drop in the plant availability factor, which fell from 69.4 percent to 66.1 percent.

Taken together, these figures reflect the extension of routine maintenance outages on nuclear plants for additional work. Last year that work included implementation of new federal rules on equipment qualification as well as replacement of steam generators and recirculation piping in several plants.

"Nuclear electricity, despite extraordinary pressures forcing its costs upward, nevertheless remains competitive with coal," AIF President Carl Walske declared. "However, it must be noted that the average U.S. nuclear capacity factor is not as high as in some countries abroad. Current improvement programs in this country will raise capacity factors and exert a downward pressure on costs."

The AIF survey, which categorizes plants by year of initial operation, also demonstrates that extended construction times and delays in completion of many of the newer nuclear power plants have had a telling effect on the capital cost factor. (Average construction time for nuclear plants more than doubled from 5 years in 1970 to approximately 12 in 1980.)

REVIEWS

Table 1

U.S. Average Electrical Generating Costs and Power Plant Performance, 1983

For units entering commercial service in the years listed[1]

Initial Year of Commercial Operation	Number of Units	Generating Capacity (MWe)	Total[2] Generating Cost (¢/KWh)	Capital Cost (¢KWh)	Fuel Cost (¢/KWh)	O & M Cost (¢/KWh)	Other[3] Cost (¢/KWh)	Capacity[4] Factor (%)	Availability[5] Factor (%)	Forced[6] Outage Rate (%)
					Nuclear					
1970	4	2,368	2.4	1.0	0.8	0.6	0.0	67.3	75.6	5.4
1971	4	2,694	2.7	1.1	0.7	0.9	0.0	65.2	76.3	6.0
1972	8	5,458	2.5	1.0	0.7	0.7	0.1	73.5	75.1	6.4
1973	7	5,167	2.5	1.2	0.6	0.6	0.1	64.5	72.1	3.5
1974	11	8,714	2.8	1.2	0.7	0.8	0.1	58.7	65.3	10.8
1975	8	6,826	3.6	1.8	0.6	1.1	0.1	53.7	59.8	6.6
1976	4	3,649	6.4	3.8	0.8	1.8	0.0	30.7	37.2	30.1
1977	7	5,851	4.2	2.3	0.7	1.1	0.1	64.4	66.6	11.4
1978	2	1,977	2.9	2.1	0.5	0.3	0.0	71.2	74.9	18.5
1979	1	757	4.7	2.6	0.6	1.4	0.1	56.2	65.9	16.7
1980	2	1,748	3.2	2.0	0.7	0.5	0.0	66.7	71.0	11.4
1981	4	4,079	5.5	3.8	0.6	1.0	0.1	47.9	54.6	21.2
1982	1	1,128	3.3	2.3	0.5	0.5	0.0	62.3	65.4	11.9
Totals or Weighted Averages	**63**	**50,416**	**3.5**	**1.8**	**0.7**	**0.9**	**0.1**	**59.5**	**66.1**	**10.1**
					Coal					
1970	4	1,805	2.8	0.8	1.7	0.3	0.0	62.6	82.3	6.1
1971	8	4,846	3.2	1.0	1.9	0.3	0.0	55.3	77.1	8.4
1972	6	3,651	3.3	0.9	2.1	0.3	0.0	61.1	81.3	10.4
1973	6	5,388	2.9	0.8	1.9	0.2	0.0	60.6	81.9	10.1
1974	5	4,301	2.9	0.7	2.0	0.2	0.0	62.1	90.0	5.3
1975	6	4,619	3.1	0.8	2.1	0.2	0.0	62.5	87.8	6.2
1976	3	2,272	3.5	1.3	1.8	0.4	0.0	61.9	81.9	7.4
1977	2	1,410	3.9	1.5	1.8	0.6	0.0	57.1	81.3	3.7
1978	4	2,217	3.6	1.4	2.0	0.2	0.0	59.0	86.0	3.6
1979	3	1,284	3.5	1.8	1.3	0.3	0.1	44.2	81.1	2.1
1980	6	4,457	5.1	2.6	2.1	0.4	0.0	52.9	84.2	6.5
1981	2	691	4.0	1.9	1.9	0.2	0.0	57.1	78.6	1.3
1982	3	2,030	4.9	2.2	2.5	0.2	0.0	55.2	86.6	3.3
Totals or Weighted Averages	**58**	**38,971**	**3.5**	**1.2**	**2.0**	**0.3**	**0.0**	**58.6**	**83.1**	**6.6**
					Oil					
1970	0	—	—	—	—	—	—	—	—	—
1971	1	410	7.6	1.6	5.1	0.9	0.0	22.3	68.3	29.6
1972	1	401	7.0	1.8	4.9	0.3	0.0	36.8	82.9	3.0
1973	1	400	10.1	3.0	6.4	0.7	0.0	13.3	93.9	7.6
1974	4	1,377	5.6	1.2	4.2	0.1	0.0	47.9	88.6	1.9
1975	1	565	5.9	1.5	4.1	0.3	0.0	58.0	75.6	8.2
1976	1	783	6.0	1.4	4.4	0.2	0.0	35.2	89.6	7.8
1977	2	1,608	6.4	1.3	4.9	0.3	0.0	38.9	88.8	6.6
1978	1	506	5.1	1.0	4.0	0.1	0.0	43.4	92.5	2.7
1979	0	—	—	—	—	—	—	—	—	—
1980	1	783	8.9	3.9	4.8	0.2	0.0	31.0	96.5	1.9
1981	1	783	8.4	3.5	4.7	0.2	0.0	27.3	78.3	9.8
1982	0	—	—	—	—	—	—	—	—	—
Totals or Weighted Averages	**14**	**7,616**	**6.4**	**1.7**	**4.5**	**0.2**	**0.0**	**37.5**	**86.4**	**5.6**

NOTES

[1] Base-load units of 400 MWe or larger capacity, entering commercial operation from 1970 through 1982 and in commercial service during all of 1983. All utilities having at least a 10 per cent interest in one or more nuclear units are included.

[2] Total cost includes capital, fuel, operation and maintenance, carrying charges, insurance and taxes as well as costs incurred while any unit was not on line but remained in commercial service during the year. For nuclear units, "total cost" includes present allowances for decommissioning and waste management, where permitted by state regulatory authorities.

[3] Other cost represents generating expenses not recorded by the reporting utilities in capital, fuel or operation and maintenance categories.

[4] Capacity factor is the percentage of electricity produced compared with the amount which could have been produced at continuous full power.

[5] Availability factor is the percentage of time during which the unit was capable of producing power at some level, whether or not it was actually in service.

[6] Forced outage rate is the percentage of time during which the unit was not available to produce power when required for service, due to component or other failure.

Table 2

Power Plant Units Included in the AIF 1983 Economic Survey

By Initial Year of Commercial Operation

	Nuclear	**Coal**	**Oil**
1970	Dresden 2 Ginna Millstone 1 Point Beach 1	Avon Lake 9 Cheswick 1 Conemaugh 1 Stuart 2	—
1971	Dresden 3 Monticello Palisades Robinson 2	Amos 1 Barry 5 Conemaugh 2 Mitchell 1 Mitchell 2 Sammis 7 Stuart 1	Montville 6
1972	Maine Yankee Pilgrim 1 Point Beach 2 Quad Cities 1 Quad Cities 2 Surry 1 Turkey Point 3 Vermont Yankee	Amos 2 Bowen 2 Eastlake 5 Gorgas 10 Powerton 5 Stuart 3	Bowline Point 1
1973	Fort Calhoun 1 Indian Point 2 Oconee 1 Prairie Island 1 Surry 2 Turkey Point 4 Zion 1	Amos 3 Cumberland 1 Cumberland 2 Mt. Storm 3 Roxboro 3	Middletown 4
1974	Arkansas Nuclear One 1 Browns Ferry 1 Cooper Duane Arnold Kewaunee Oconee 2 Oconee 3 Peach Bottom 2 Peach Bottom 3 Prairie Island 2 Zion 2	Belews Creek 1 Bowen 3 Conesville 4 Gaston 5 Gavin 1 Stuart 4	Anclote 1 Bowline Point 2 Roseton 1 Roseton 2
1975	Browns Ferry 2 Brunswick 2 Calvert Cliffs 1 Cook 1 Fitzpatrick Hatch 1 Millstone 2 Rancho Seco	Belews Creek 2 Bowen 4 Columbia 1 Gavin 2 Neal 3 Powerton 6	Mystic 7
1976	Beaver Valley 1 Indian Point 3 St. Lucie 1 Trojan	Mansfield 1 Sherburne County 1 Wansley 1	Manatee 1
1977	Browns Ferry 3 Brunswick 1 Calvert Cliffs 2 Crystal River 3 Davis-Besse 1 Farley 1 Salem 1	Mansfield 2 Sherburne County 2	Manatee 2 Poletti

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	Nuclear	**Coal**	**Oil**
1978	Cook 2 North Anna 1	Columbia 2 Council Bluffs 3 Miller 1 Wansley 2	Anclote 2
1979	Hatch 2	Gentleman 1 Neal 4 Nebraska City 1	—
1980	Arkansas Nuclear One 2 North Anna 2	Boardman Campbell 3 Mansfield 3 Mountaineer 1 Roxboro 4 White Bluff 1	Martin 1
1981	Farley 2 Salem 2 Sequoyah 1 McGuire 1	Ottumwa 1 White Bluff 2	Martin 2
1982	Sequoyah 2	Crystal River 4 Gentleman 2 Scherer 1	—

"As our surveys demonstrate, and the experience of our overseas neighbors underscores, if nuclear power plants are built in less than eight years they are the most economic producers of thermal electricity in the world," Walske said.

"The two lowest-cost energy sources available for future electrical growth in the United States are coal and nuclear," Walske continued. "Healthy competition between them remains the best hope for reasonable electricity costs in the future."

Nuclear energy provided approximately 13 percent of U.S. electricity during 1983 while coal supplied nearly 55 percent.

This year's AIF survey of nuclear utilities included data from 63 operating nuclear plants, 58 coal plants, and 14 oil plants that began commercial operation in 1970 or later and were in service for all of 1983.

Total cost figures include capital expense, fuel, waste disposal, operations and maintenance, and, in the case of most nuclear plants, provision for decommissioning. Conducted annually since 1970, the survey involved 43 utilities, each of which has at least a 10 percent interest in one nuclear unit, and includes their experience with all base-load nuclear, coal, and oil plants of 400 megawatts or more. Survey figures are calculated from data provided by utilities, based on actual experience.

Tables 1 and 2 list, respectively, a detailed breakdown by year of initial service and cost component for each unit surveyed and the plants surveyed for 1983 performance.

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GUIDELINES

GUIDELINES FOR AVAILABILITY ENGINEERING AS APPLIED TO NEW PLANT DESIGN
GUIDELINES FOR AVAILABILITY ENGINEERING AS APPLIED TO OPERATING PLANTS
EDISON ELECTRIC INSTITUTE

Prepared by members of the Availability Engineering Task Force of Edison Electric Institute, *Guidelines For Availability Engineering,* a 736-page, two-volume publication documents the overall logic of power plant availability engineering in a form useable by the electric utility industry. Contributions to the publication were made by representatives from many of the electric utilities that pioneered availability engineering practices. The two-volume set, *Guidelines For Availability Engineers As Applied To New Plant Design* and *Guidelines For Availability Engineers As Applied To Operating Plants,* is intended to provide guidance to the use of the analytical and administrative tools employed in supporting economic power plant availability in such areas as:

- Worth of Availability
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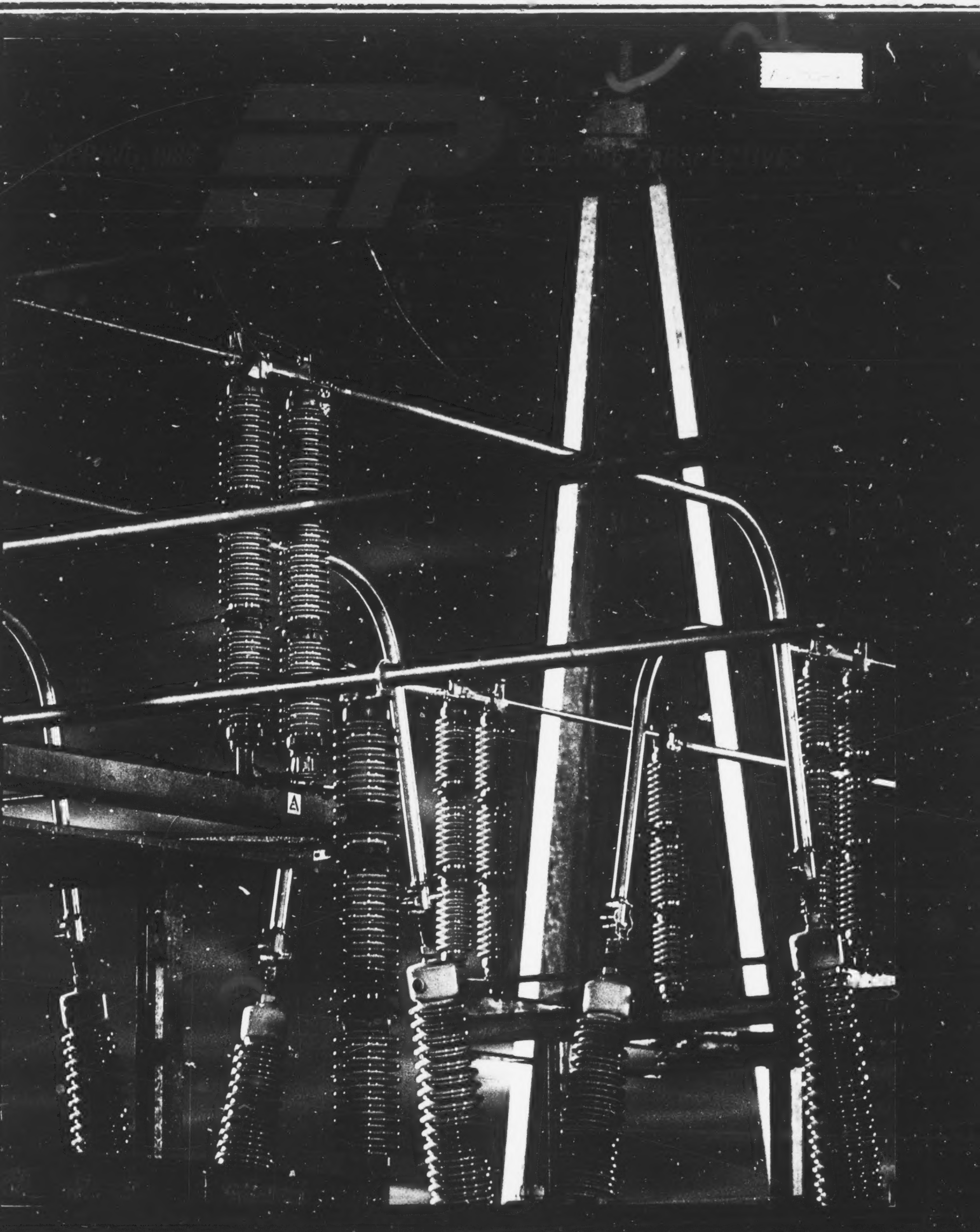
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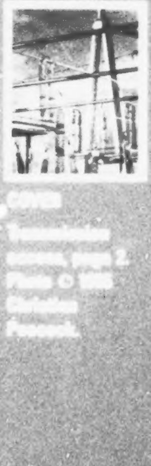

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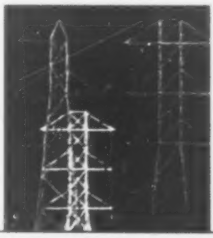

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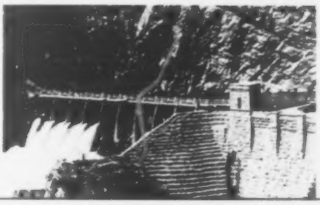

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MANDATORY WHEELING: IS COMPETITION IN THE NATION'S BEST INTEREST?

By Douglas C. Bauer and
Bruce S. Edelston

Douglas Bauer is Senior Vice President for Economics and Finance and Bruce Edelston is Manager of Economic Programs for Edison Electric Institute.

Electric utilities, like other regulated industries, are very rapidly being drawn into the deregulation debate. The debate is not about routes and fares (as in the airline industry) or about prices of new energy sources (as in the natural gas industry). Rather, it is about access to and use of the utility's transmission network. The closest parallel is probably found in telephone deregulation, where local access networks have been opened up for use by competing long distance carriers. In the electric utility industry, however, the proposal is reversed—the long distance system, here the transmission system, is to be opened up for use by competing electricity generators and possibly end users as well.

Proposals have been advanced to require electric utilities to wheel power not only for other utilities (which is already a fairly common practice) but also for non-utility sellers and purchasers of power.[1] Some proposals would require a Federal Energy Regulatory Commission order to require wheeling services; others would make transmission service available to all those desiring service, at standard rates and without discrimination.

An unusual coalition of interests has developed in support of mandatory transmission access and use. This coalition consists of state regulators (who want to take further advantage of short-term differences in costs between utilities), many federal regulators (who believe mandatory access will lead to improved "market" forces), wholesale and large retail customers (who want to "shop" for lowest cost power sources), and cogenerators and small power producers (who wish to sell their power to the utility with the highest "avoided cost" prices). Reflecting these interests, Representative Matsui (D-CA) introduced legislation (H.R. 5608) in 19[illegible] to amend the Federal Power Act with regard to its wheeling provisions.

The Historical Debate

In 1935, Congress first sought to address the highly complex issue of competition versus coordination in bulk power supply. Congress carefully weighed the position of two groups: those who argued in favor of imposing "common carrier" obligations on transmission owners as a means of expanding competitive opportunities; versus, those who expressed concerns that such competition would be "destructive" and result in higher costs and less reliable service. The final decision, reflected in the legislative history of Part II of the Federal Power Act, was to restrict the newly created Federal Power Commission's control over the ordering of system interconnections and wheeling. This decision to deny the FPC freedom to mandate third-party transmission services demonstrated a significant reliance on voluntary coordination among the individual utilities to achieve desired levels of economy and efficiency.

Since passage of the Federal Power Act of 1935, there have been numerous efforts to provide the FPC, now the Federal Energy Regulatory Commission (FERC), with additional manda-

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The utility would be required to provide transmission services to virtually any party requesting them.

. . . numerous court decisions have affected utility wheeling obligations.

tory wheeling authority. Most recently, in 1978, Congress was presented with a broad range of proposals to open up transmission systems. After considerable debate, Congress made only limited changes in the scope of the Commission's wheeling authority. These changes, reflected in the Public Utilities Regulatory Policies Act of 1978, grant FERC authority to compel wheeling after making several findings, the most significant of which requires that the wheeling order "would reasonably preserve existing competitive relationships" among the utilities affected by the order. In other words, Congress reaffirmed its opposition to introducing potentially destructive competition to the utility markets.

Concurrent with the on-going Congressional debate, numerous court decisions have affected utility wheeling obligations. The most important of these was the Otter Tail Power case (*Otter Tail Power Company v. United States*, 1973) in which the courts held that mandatory wheeling may be required as a remedy to demonstrated antitrust violations. However, the courts have consistently held that there is no comprehensive utility wheeling obligation under current statutes. The real extent of utility obligations to wheel pursuant to the antitrust laws is currently not entirely clear and will probably be decided on a case-by-case basis.

The final area of law that relates to utility wheeling obligations is the requirements of the antitrust provisions of the Atomic Energy Act of 1954. A number of utilities have been subjected to varying degrees of wheeling obligations under Nuclear Regulatory Commission (NRC) licensing conditions since the early 1970s. These conditions frequently extend to all of a utility's transmission facilities and not just to those lines directly related to the plant being licensed. Thus, the NRC's authority with respect to mandatory wheeling is fairly significant.

Current Arguments

The recent growing interest in wheeling can be traced to a number of factors:

- In an era of rising electricity prices, larger utility customers perceive an opportunity to reduce short-term energy costs through "off system" purchases. In this way, power is purchased from remote suppliers at a reduced rate while the customer enjoys the benefit of retaining the local utility's service obligations to ensure that power requirements are met.

- The possibility of greater intersystem power transfers offers a welcomed alternative to the escalating costs, regulatory uncertainties, and severe financial risks involved in constructing new generating facilities. It is believed that enhancement of the currently extensive transfers would enable utilities to defer new capacity additions.

- Long lead times for new plant construction, together with declining load growth, have contributed to substantial levels of "surplus" generating capacity with low marginal costs in some regions. Many argue that this temporary surplus could be used to a greater extent to "displace" higher cost generation elsewhere.

- Current trends in deregulation have led to analogies between contract carriage in the gas pipeline industry and electric power transmission, with a focus on the potential for industrial "competition." In fact, FERC already has initiated an

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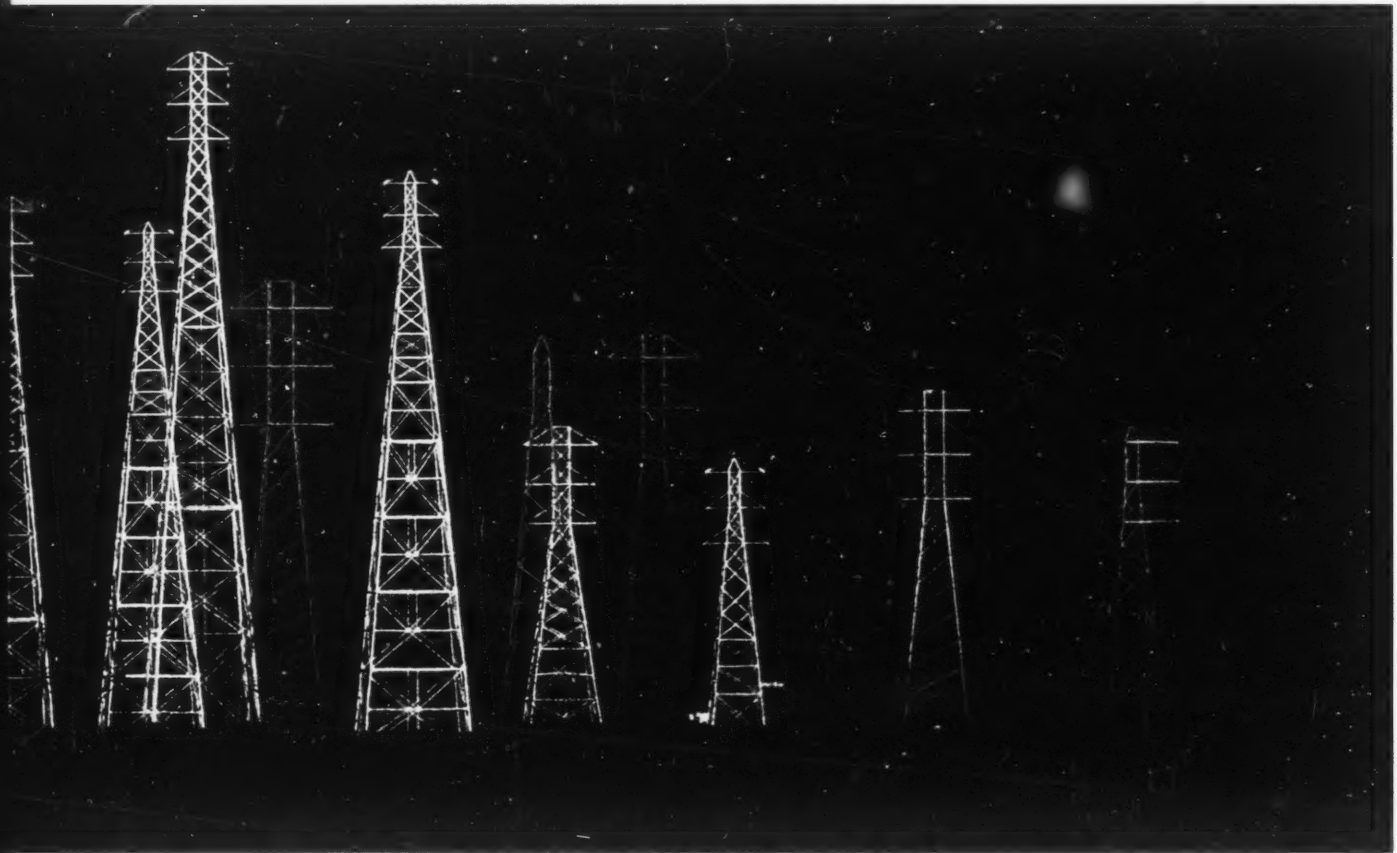
experiment to examine opportunities for competition in selected segments of the bulk power market.

- Finally, the Public Utility Regulatory Policies Act of 1978 offers substantial economic incentives for the development of non-utility-owned cogeneration and designated small power "qualifying facilities." As a result, qualifying facilities desire to sell their power to that utility within economic transmission distance that offers the highest "avoided cost" purchase price (i.e., the cost otherwise incurred by the utility to supply an equivalent amount of power). The common denominator uniting these interests is the desire to foster competition in bulk power (and sometimes retail) markets, resulting, proponents of mandatory wheeling say, in a lower cost, more efficient electric power supply system.

The proponents fall into two main factions. One faction advocates placing electric utilities under a sort of common carrier obligation. The utility would be compelled to provide transmission services under uniform and nondiscriminatory terms and conditions to virtually any party requesting them. The utility's options to refuse such requests—whether or not it views them as contrary to the economic interests of its own customers—or to impose advance reservation and notification requirements on the availability of transmission service would be restricted. As a consequence of these imposed conditions, many utilities would be forced to expand transmission capacity to

Wheeling was not a major consideration in the design and planning of today's high-voltage transmission network.



New proposals for mandatory transmission access could lead to rate increases . . .

accommodate *all* requests for service.

A second faction wishes to expand FERC's existing authority to order a utility to provide third-party transmission services. This proposal differs from the "common carrier" obligation in that a FERC order, perhaps with some conditions, would still be necessary prior to mandating a specific wheeling service.

The Investor-Owned Industry's Response

Recognizing the growing interest in mandatory transmission access, the Edison Electric Institute formed a Transmission Access Task Force in 1983 to assess emerging proposals and to provide a forum for exchange of views and information among companies. An industry position, which calls for retention of the current system of voluntary power exchange and wheeling, evolved from the work of the Task Force. That position is based on four major premises:

1. The present basically voluntary system for transmission access has worked well, providing reliability and economy to retail and wholesale customers.

2. New proposals for mandatory transmission access or utilization could impinge upon the safety and reliability of the electric power supply system.

3. New proposals for mandatory transmission access could lead to rate increases for residential and smaller commercial and industrial customers unable to "shop" for lower cost sources of power.

4. New proposals for mandatory transmission access are contrary to the utility's fundamental obligation to serve its customers and will make efficient utility system planning and resource development difficult, if not impossible.

In addition, an aggrieved utility has the right now to seek a mandatory wheeling order from FERC, under suitable economic and reliability conditions.

The Present Voluntary System

An examination of the limited data available concerning wheeling services suggests that investor-owned utilities routinely provide a broad range and increasing level of services on a voluntary basis. Over 118 billion kWh of energy was wheeled by investor-owned utilities in 1981, and amounted to approximately 7.2 percent of the total energy delivered to ultimate customers. This is a sizable figure in light of the fact that wheeled energy accounted for a mere 4.3 percent of the total energy delivered to ultimate customers only a decade ago. In other words, the amount of energy wheeled increased by nearly 141 percent in that ten-year interval while ultimate sales only increased by 42 percent.

Table 1

Transmission Delivered by Investor-Owned Electric Utilities: 1961-1981

(Thousand mWh)

Year	Transmission Delivered
1981	118,641
1976	70,686
1971	49,928
1966	21,736
1961	10,379

Moreover, additional wheeling routinely occurs within formal power pools and among the member companies of holding company systems. For a variety of reasons, these transactions generally are not reported in industry wheeling statistics. Neither is the substantial amount of energy wheeled between non-contiguous systems in two-party purchase and sale ("displacement") transactions. Clearly, the present voluntary system for transmission access and utilization has worked exceedingly well in terms of both the magnitude and diversity of services offered. (See Tables 1 and 2 and Figures 1 and 2.)

Potential Impacts on Supply Reliability

Transmission systems are complex electrical networks connecting generating sources and load centers. The flow of electricity from generation to load is determined by the electrical characteristics of the network, and it cannot be controlled or directed from point to point over specific contractual paths. With few exceptions (such as the Pacific Northwest Intertie), wheeling was not a major consideration in the design and planning of today's high voltage transmission network, and current transmission systems are designed to link generators and loads under conditions of multi-directional power flow.

To reduce the need for generating reserves and to maintain reliability under emergency conditions, utilities often have interconnected their transmission systems. These "reliability" interconnections also have allowed utilities to exchange economy power when an interconnected utility has had lower cost power available. Many such economy transfers currently are taking place as a result of the increasing fuel/cost disparity between utility systems. Because of lower-than-anticipated load growth over the past few years, the utility industry has had capacity available to accommodate these interutility and interregional economy transfers—a temporary situation at best. Additional transfers would, in many cases, require a strengthening of the transmission system. Efforts in this area, as a rule, have been delayed by local regulatory and licensing problems based on land use, environmental, health, and safety concerns.

Table 2

Summary of the Types and Numbers of Wheeling Service Agreements on File at the Federal Energy Regulatory Commission

Agreement Type	Firm Wheeling	Non-firm Wheeling	Firm & Non-firm Wheeling	Total
Transmission Service	453	177	29	659
Transmission Tariff	7	7	2	16
Power Pool	5	2	8	15
Interconnection Coordination	104	98	22	224
Interconnection Coordination/ Transmission	16	4	1	21
Facilities	4	1	—	5
Partial Requirements	28	12	1	41
Partial Requirements/ Transmission	43	5	—	48
Full Requirements	11	1	1	13
Full Requirements Transmission	17	—	—	17
Full & Partial Requirements	1	1	—	2
Other	3	1	—	4
Total	692	309	64	1065

Source: Edison Electric Institute

Another important feature of transmission systems is their regional diversity, which reflects the substantially different needs and circumstances prevailing among the nation's utilities. Transmission service arrangements must be negotiated individually relative to these circumstances to assure system reliability. Reliable operation requires advance knowledge of how the system will be used, and only minute-by-minute control over a transmission system will ensure that defined limits are not exceeded. For these reasons, "unconstrained" wheeling—in which control over access and use are taken away from the system operator—directly opposes the functions for which these systems were designed.

Furthermore, reliable operation does not hinge solely on individual utilities, but on coordinated and responsible efforts by all parties in an interconnected system. Through careful power scheduling and continuous monitoring by hundreds of control centers within the network, service continuity is maintained. This requires voluntary compliance with established principles of interconnected operation on the part of all utilities. Without this special orchestration of activities, system operation could become chaotic, and the industry's superb record of reliability could be threatened.

Potential for Rate Increases

It has been the consensus of government policy throughout the electric industry's modern history that the lowest cost and most reliable level of service is provided by a single regulated supplier obligated to serve all customers within a "territorial franchise" (or defined market area.) For this reason, the laws of most states discourage or preclude competition for either wholesale or retail customers. Based on the cyclical pattern of new plants coming into service and the expiration of fuel supply contracts, at times a given utility likely will have higher production costs than neighboring utilities for a while. Without the stability of exclusive service areas and reasonable protection against "pirating" of existing customers, there would be uncontrolled customer "rate shopping" to take advantage of such short-term rate differentials.

Adverse rate impacts would result if large customers were allowed to shop around and purchase power off-system. In such a situation, the fixed costs of ca-

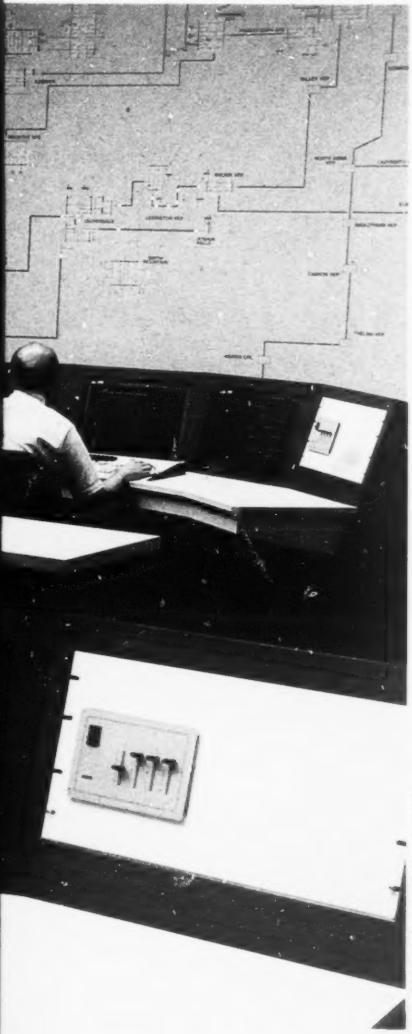
Major utility control center and giant display board for seven-state power system.

. . . no electric supplier would continue to incur the risk of building new generating facilities . . .

pacity—planned and installed to serve their loads as well as those of the utility's other customers—would be borne by the utility's remaining customers, generally residential and smaller commercial and industrial users. The resulting higher rates would encourage greater numbers of remaining industrial and commercial customers to seek lower cost off-system purchases. Fixed costs then would be reallocated to those "captive" customers left on the system who were unable to contract for alternative supplies. These fewer customers would be required to pay inordinately higher rates for service in what could be a continuous upward spiral.

A utility might also be required to maintain sufficient reserve capacity to serve its former customers' future needs should they desire to return to their original supplier. This is a real possibility if the short-term rate advantages which initially prompted the off-system purchase dissolve or if the customer's off-system supplier has to interrupt service. Additionally, the transmission capacity used by customers purchasing off-system may reduce the utility's own ability to purchase and distribute lower cost power, thereby further increasing rates to its customers.

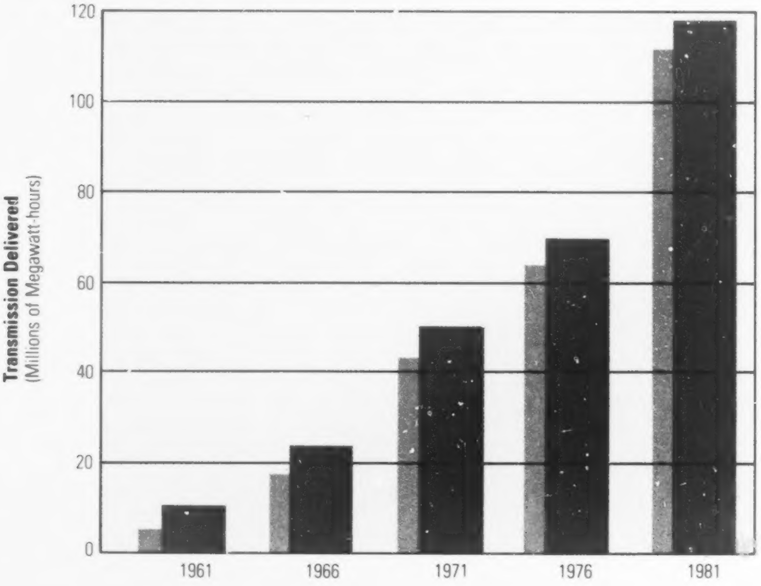
Without a defined and reasonably predictable geographic market for the output of its power—or a substantially higher rate-of-return on investment—no electric supplier would continue to incur the considerable financial risk of building new generating facilities in an uncertain market characterized by competition among multiple suppliers. The adequacy



American Electric Power Service Corporation

Figure 1

Growth in Wheeling Services by Investor-Owned Electric Utilities, 1961-1981



Source: U.S. Department of Energy

. . . careful consideration would have to be given to the utility's 'obligation to serve' requirements.

and efficiency of service will be jeopardized if competition creates disincentives to invest in the most economically scaled plant or to engage in voluntary intersystem coordination. Proposals advocating increased competition through mandatory wheeling do not address adequately the direct trade-offs among competition, efficiency, service obligation, and the resulting shifts in the burdens of costs among customers.[2]

The Fundamental Obligation to Serve

In return for being granted a monopoly franchise territory, a utility assumes an obligation to serve all customers desiring service, at reasonable rates, and without undue discrimination. These responsibilities—together with the capital intensive nature of new power supply facilities and the associated long lead times—dictate the need to impose a corresponding obligation on customers to purchase the output of facilities built on their behalf or to compensate the utility for those costs if they purchase "off system." (Barring this proposition, a reduction in the service level must reasonably be expected.)

Without this purchase "obligation," there would be far greater uncertainty in forecasting and planning adequate generation and transmission capacity—factors which would affect both the quality and costs of electric service. The large capital investments necessary to provide electric service could not be undertaken if, in addition to all the risks now present, there would be no assurance of a customer base to use electricity from new power facilities.

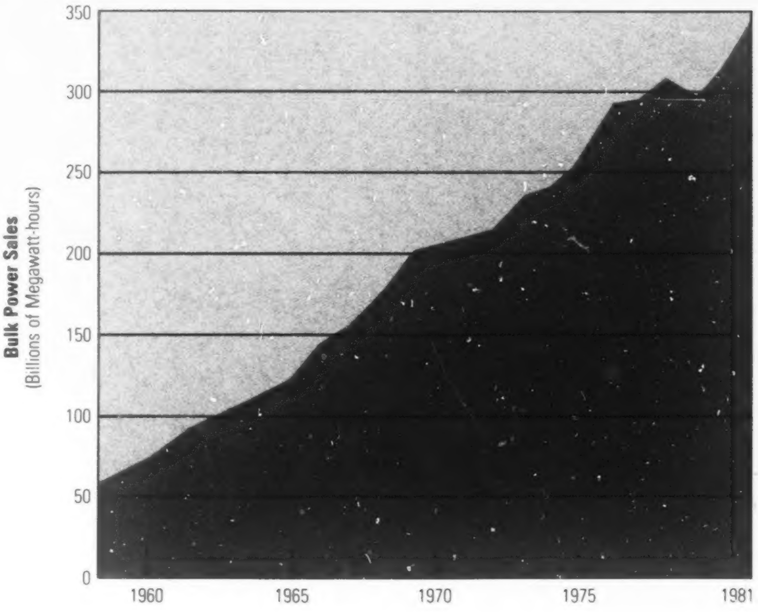
If both retail and wholesale customers were allowed to leave the system and return at will, then careful consideration would have to be given to amending the utility's "obligation to serve" requirements. Without such consideration, utilities might plan for too much capacity (with the result of increased costs to ratepayers) or insufficient capacity (with deleterious effects on reliability). Cost increases also could occur if the utility is required to provide back-up power or transmission capability to the off-system purchaser, or if the utility has an obligation to serve such customers when their source for off-system purchases is no longer available.

Conclusions

Based on the evidence of extensive and diverse wheeling services already provided voluntarily under terms and conditions approved by regulatory authorities, it appears that the real debate is not over utilities' refusals to provide transmission services but rather the unwillingness of some groups to accept the reasonable limitations that have been placed on transmission access and utilization. These limi-

Figure 2

Growth in Bulk Power Sales by Investor-Owned Electric Utilities, 1960-1981



Source: U.S. Department of Energy

tations protect the legitimate interests of the wheeling utility and its customers. Although the concept of enhanced competition in certain segments of the bulk power market is theoretically attractive, the fundamental economic and engineering attributes of the electric power system, coupled with the entrenched utility service obligations, make it unlikely that greater competition in either retail or full-requirements wholesale markets, as envisioned in recent proposals to broaden transmission accessibility, would benefit the American public.

This is not to suggest that there are no opportunities for increasing economic efficiencies in the electric power supply system. Attention should be focused on some of the positive opportunities afforded by regional differences in power availability and costs. In particular, where transmission bottlenecks prevent the economic transfer of power, it should be an important public policy objective to foster an environment in which new transmission lines can be constructed. Initiatives such as the Southwest Bulk Power Market Experiment, where FERC is examining the effects of deregulating certain types of bulk power transactions, are important as well.

However, mandatory transmission access, beyond that provided for in current law, will primarily result in a mere shifting of cost burdens between electricity users. To achieve real efficiency gains, we must focus attention on the long-term constraints to increasing the level of economic exchanges and wheeling services. Among the constraints that should be examined are transmission bottlenecks and their relief, the design of rates for transmission service that provide proper incentives, and institutional and regulatory barriers that may inhibit efficient *voluntary* transmission service arrangements between utilities.

There would be no assurance of a customer base to use electricity from new power facilities.

Notes

1. Wheeling is defined here as transmission services provided by a utility on a pre-arranged basis to deliver either (a.) power generated outside its own system to the system of another utility or end user or (b.) power generated within its service area by a non-utility to another utility.

2. One of the most hotly contested controversies of the AT&T divesture has been the need to shift some costs to residential users to prevent large business customers from bypassing the local networks, which would leave residential customers with even higher cost increases.

INTENTIONAL
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FOREST DECLINE IN WESTERN EUROPE

By Robert A. Beck

Robert Beck is an Environmental Program Manager for Edison Electric Institute

During the last several years, the debate about acid rain in the United States has spread beyond concern about the health of certain lakes and water systems to include discussions of its possible impact on forests, particularly those located near the tops of some of the highest eastern mountain peaks. For example, scientists have identified a decline in forest productivity around Camel's Hump, Vermont, and Mount Mitchell, North Carolina, and some speculate that acid rain is the culprit.

In Western Europe, where the debate about acid rain first began, researchers have been studying acid rain's impact on forests for years. What have they learned? And what can we learn from them?

In October of 1984, I went to Europe to find out. And despite the popular American conception that all of Europe—the scientists, the politicians, and the populace—agrees that acid rain is the sole cause of the continent's declining forests, I learned that there, like here, that thesis is the subject of heated scientific debate.

The Black Forest

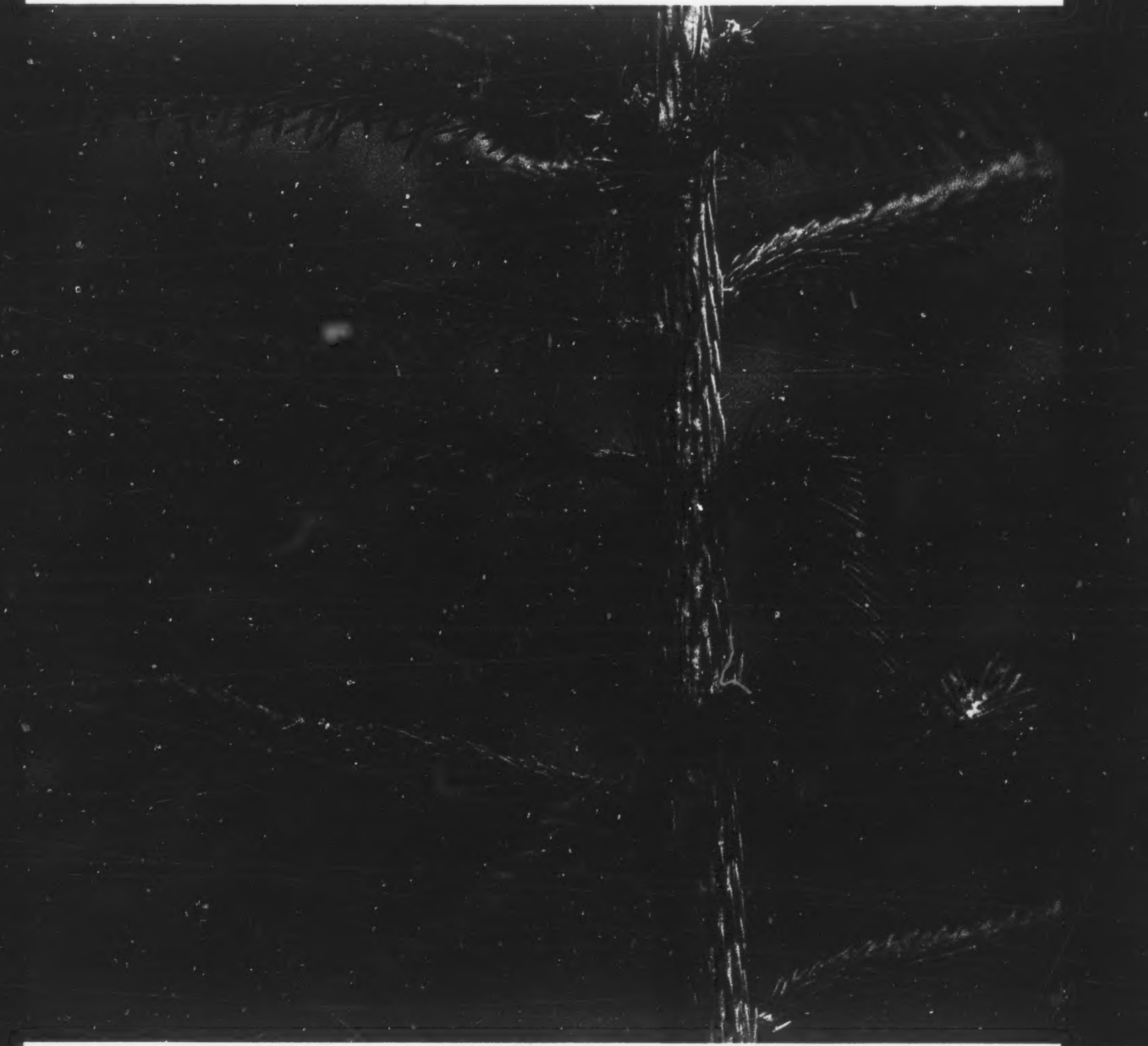
For 15 years, Dr. Hans Zöttl, a professor at the University of Freiburg's Institute of Soil Science and Forest Nutrition, has studied the Black Forest, which lies in the southwestern part of West Germany near the French and Swiss borders. He believes that the tree damage evident there is related more to the presence and absence of particular nutrients in the soil than it is to acid deposition or soil acidity.

The chief symptom of the Black Forest's ill health is the yellowing of needles in silver fir, Norway spruce, and scotch pine trees. Researchers also have observed in the last year that European beech trees are dropping leaves prematurely and that all of these species are thinning at the crown.

Research into the cause of the latter two symptoms is just beginning, but the yellowing is understood relatively well. It is caused primarily by a deficiency of calcium, magnesium, potassium, or zinc in the plant. In some areas of the Black Forest, soils have shown a 70 percent decrease in potassium levels over the last 15 years. Zinc levels have also decreased.

Professor Zöttl is not sure of the cause of the documented nutrient deficiencies, but it does not appear to be related to soil acidity or acid deposition. In fact, data show no increase in soil acidity over the last 15 years. (The soil pH in the humus layer of the Black Forest is 3.8 to 4.0 and increases with soil depth, and the pH of rainfall averages 4.5 or higher.) Nor is there evidence of either aluminum mobilization in the soil or aluminum toxicity in the fine root hairs of the trees, although aluminum is present in the soil in amounts that would be mobilized if acidity were a problem.

To support his theory that nutrient deficiencies and not soil acidity or acid rain are the cause of the Black Forest's decline, Professor Zöttl has embarked on a large forest fertilization project applying calcium nitrate at a rate of 600 kilograms/hectare/



Norway Spruce in the Black Forest of West Germany.

year and magnesium sulfate at a rate of 400 kilograms/hectare/year. Although neither the soil acidity nor the ambient atmospheric pollutant concentration is altered, within four months of application yellow trees become green and healthy-looking again. The fertilizer has been applied manually and by truck both to the soil and directly to the needle surface of 15- to 20-year-old silver fir and Norway spruce trees.

Forests of Bavaria

Research on the forests in Bavaria, which lies to the east of the Black Forest, is being conducted at the University of Munich by Professor Dr. Rehfuess and Professor Dr. Schütt, with the assistance of the Bavarian Department of Forests, Agriculture, and Nutrition, which is directed by Dr. Hubert Roessner. These researchers believe that Bavaria has the healthiest forests in West Germany, and their efforts are directed toward protecting them and preventing any future damage.

Soil acidity does not appear to be a cause of tree damage in Bavaria. Atmospheric data in the state indicate no increase in ambient sulfur dioxide concentrations over the past ten years. However, over that same period, nitrous oxide levels have increased in proportion to increases in vehicular traffic in the state.

Dr. Roessner believes that increased nitrogen oxides and ozone levels are the primary concerns that need to be addressed to protect Bavarian forests. Also, because of a magnesium deficiency, some trees do exhibit yellow needles. To correct the problem, Dr. Roessner is conducting fertilization projects, adding magnesium sulfate at the rate of 400 kilograms/hectare/year. Preliminary results are promising, especially with Norway spruce.

Specific calcium and magnesium deficient tree growth.

The research of Professor Rehfuess and Professor Schütt confirms that soil acidification and aluminum mobilization are not occuring in Bavaria. In fact, Professor Schütt contends that the soil is not involved at all in the tree damage, and he is investigating the reaction needles and leaves have to the direct exposure of certain gases.

Fichtelberg, The Solling, and The Hartz Mountains

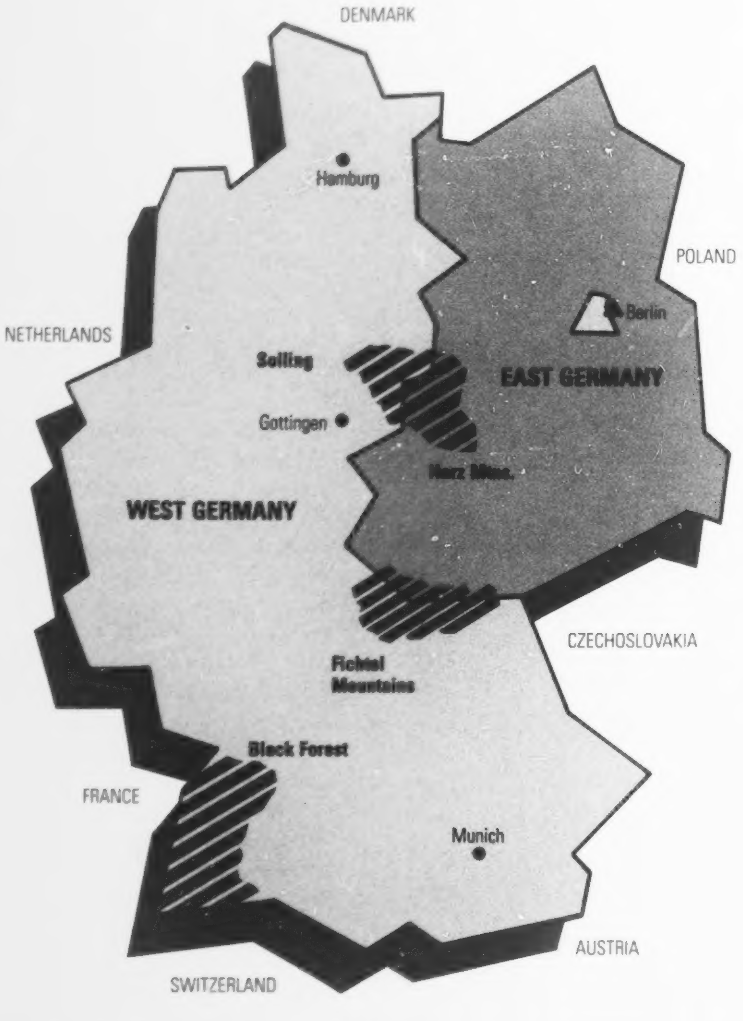
While many qualified scientists conduct research in this central area of West Germany, the principal forestry scientist there is Professor Dr. Ulrich. Since 1966, he has been studying the overall ecology of forested ecosystems at the University of Gottingen. His technique includes measuring the total input, metabolism, and output of chemical elements within the forest nutrient cycle.

The Hartz Mountains area is just now beginning to show signs of stress, but Fichtelberg and the Solling Plateau areas are experiencing the most severe tree damage in West Germany. The latter two areas are within 60 kilometers of the East German border, which puts them in close proximity to, and downwind of, the heavily industrialized areas of Dresden and Leipzig, where high sulfur coal (4-5 percent sulfur) is burned with no pollution control equipment. As a result, the Solling and Fichtelberg areas experience an annual sulfate deposition rate of 95 kilograms per hectare—almost three times higher than the deposition rate in the Adirondack Mountains of the United States and twice the amount received by the Black Forest and Hartz Mountains. It

Table 1

Sulfate Deposition in Kilograms/Hectare/year

Black Forest	47kg./H/yr.
Bavaria	45kg./H/yr.
Central W. Ger.	97kg./H/yr.
Upper New York	30-35kg./H/yr.
Tenn./N. Carolina	30-34kg./H/yr.

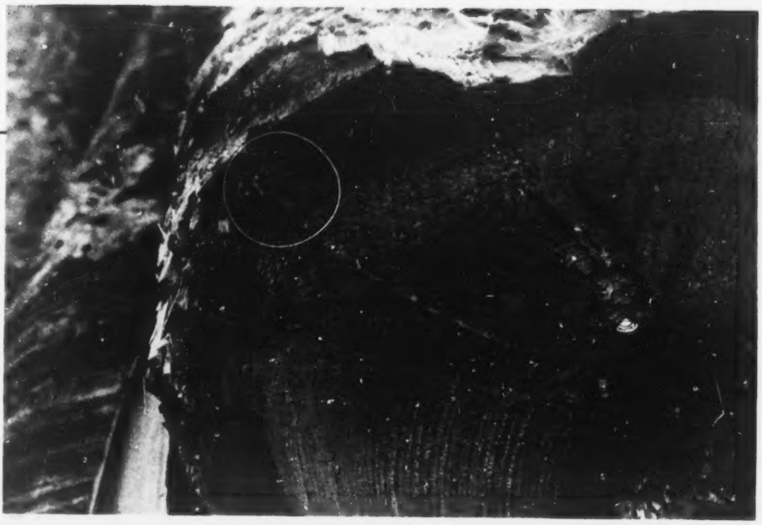

DENMARK
Hamburg
POLAND
Berlin
NETHERLANDS
Solling
EAST GERMANY
Gottingen
Harz Mtns.
WEST GERMANY
CZECHOSLOVAKIA
Fichtel Mountains
Black Forest
FRANCE
Munich
AUSTRIA
SWITZERLAND

is a unique situation. (See Table 1.)

Symptoms exhibited by forests of this region are similar to those in other parts of West Germany: needle yellowing and crown thinning, primarily in Norway spruce. Professor Ulrich believes that the ultimate cause of this damage is acid rain. Sulfate deposition, he says, acidifies the soil, mobilizing metals—primarily aluminum—in it. He theorizes that aluminum kills the fine root hairs of the trees, which respond by growing new fine roots. The new roots, in turn, are stressed by the aluminum, and thus, the toxicity cycle is repeated. Professor Ulrich argues that comparison of the fine root-hair mass of healthy trees with that of damaged trees verifies his theory. He also believes that, by analyzing root-hair masses, long-term forest damage can be predicted 20 years into the future.

Although Professor Ulrich believes sulfate acidity is the primary destroyer of fine root-hairs, he also thinks that nitrates damage trees in non-acidic soils. He responds to doubts expressed by people such as Professor Zöttl and Professor Rehfuess by arguing that even in non-acidic soil high nitrate levels can block a plant's uptake of potassium if its fine root hairs are damaged. The source of excess nitrate can be either gaseous respiration in the tree's needles or nitrate deposition in the soil.

Professor Ulrich believes that more acidity enters the Black Forest through the canopy than through the soil, but he holds



Tree growth reduction shown by diminishing growth rings.

that nutrient deficiency always can be traced to fine root-hair destruction. And even though he concedes that ozone, insects, and harsh climate play some role in tree damage, he maintains that they affect only trees that were predisposed to such damage by fine root-hair destruction.

Neither the scientists in the Black Forest area nor in Bavaria agree with Professor Ulrich's theory. Foresters throughout West Germany design their research efforts to check Ulrich's hypothesis about aluminum mobilization, and only in areas of *highly* acidic soils, such as the Solling Plateau, has his theory been confirmed.

Czechoslovakia

Forestry research in Czechoslovakia has been underway for approximately six years in two regions: the Moravian Plateau in the central part of the country near the city of Brno, and the area opposite the borders of East Germany and Poland. The principal scientists are Dr. Emil Klimo at the University of Brno and Dr. Jan Materna at the University of Prague. Their approach is much broader in scope than that of most West German researchers. They are investigating the impact of stresses such as climate, clear-cutting, urbanization, air pollution, agriculture, roads, tourism, and biological pests.

Results to date show no significant damage below elevations of 900 meters (approximately 2952 feet). Above that elevation, however, there is severe damage along the East German border and early signs of damage along the Polish border.

Czech data do not point to any one cause of damage. Both Drs. Klimo and Materna believe it is a combination of factors: air pollution, climate, land use patterns, and insects. They do not think that rainfall pH is a primary factor, since both healthy and damaged trees are present in areas receiving rainfall of the same pH in in soils of about the same level of acidity.

The Czechoslovakians are beginning an extensive reforestation and fertilization program. Larch and red spruce trees are being planted, and dolomitic lime is being applied from airplanes. The lime has raised soil pH by only 0.2. However, this small increase seems to have been sufficient—the larch and spruce are now growing in an area that previously would not support any tree growth.

England, Finland, and Sweden

In England, most of the effort to identify the extent and causes of

Monitoring equipment on Snow Mountain near the East/West German border.

The Swedes have detected forest damage, but are not certain of its extent.

forest damage has centered on chamber fumigation studies where plants are placed in a controlled environment and then treated with different concentrations of pollutants. According to Dr. T. Michael Roberts, who is with the Biological Section of the Central Research Laboratory of the Central Electricity Generating Board, these studies have been concluded for sulfur dioxide and are well underway for ozone. Dr. Roberts indicates that their research to date shows ozone as a major cause of plant damage. Final results will not be available for several months.

The Finns have not detected any significant forest damage in their country. In fact, Professor Dr. Jaakka Virtanen of the Forest Research Institute of Finland stated that there is not enough damage in Finland to allow detection by infra-red photometry—the taking of infra-red photographs of forests from airplanes. The Swedes have detected forest damage, but are not certain of its extent. Both countries are continuing to monitor the situation.

Forest devastation with healthy underbrush evidencing selectivity of damage to mature growth.

The Lessons

What can be learned from this European forestry research? First, the scientific community there does not agree that acidic deposition is the major cause of forest damage. In fact, the general consensus seems to be that the primary cause of the damage is a deficiency of nutrients in the soil, mainly calcium and magnesium. What causes these deficiencies is the subject of great debate, and research is continuing to answer the question more thoroughly. The second lesson is that forest fertilization appears to be a useful tool in recovering damaged trees and protecting healthy ones.

Both points are valuable ones to remember as the acid rain debate continues in this country. We should also remember that, unlike emissions in most Western European countries, sulfur dioxide emissions in this country have decreased by 26 percent over the last 10 years due to the Clean Air Act of 1970, even though domestic coal usage has increased by 53 percent. Perhaps even more importantly, the decline in U.S. emissions will continue. Clearly, a rush to accelerate the emissions reductions would be extremely costly to U.S. electric consumers. But, based on the latest research in this country and in Europe, it is not clear that new reductions would yield any significant environmental benefits. ■

1985 PERSPECTIVES ON ELECTRIC POWER—PRIORITY ISSUES

By William McCollam, Jr.

As President of Edison Electric Institute, the association of America's investor-owned electric utilities, William McCollam Jr., addresses the New York Society of Security Analysts each February, reporting on the industry's condition and prospects. This text is based on the remarks he made to the Society this year.

One way to think of our industry is to visualize it as a flotilla of companies of varying sizes and capabilities, working its way through a season of stormy seas. Looking back over the last several years of the storm, we have done fairly well. For some companies, particularly those with nuclear plants under construction, there are still serious shoals ahead. Still, compared with the views generally held of our industry five or six years ago, we can share a sense of accomplishment—and relief.

Of course, there will continue to be tough decisions for utility managements to make as we steer through the difficulties ahead. We see our basic problems today as involving customer acceptance and understanding of the value of the service which they purchase from the corporations that make up the investor-owned electric utility industry, and the understanding of customers and investors of the competence of the managements responsible for making this service available. As we look around the industry, we see more and more companies attacking these problems aggressively, imaginatively, and—hopefully—with increasing effectiveness.

Viewed on an over-all basis, the electric utility industry continued to show signs of regaining financial health last year. Economic recovery, relatively low inflation, and moderate interest rates contribute to a relatively bright outlook for the industry as a whole.

EEI is expecting a rate of growth for output in the 3 to 3½ percent range for 1985, and in the 2 to 3 percent range for peak load, assuming normal weather. We expect electricity to grow at approximately the rate of GNP.

As we have noted previously, the linkages between electricity and the economy are complex and involve a number of factors. Furthermore, electricity consumption is not merely the passive result of GNP, but also a key contributor to economic growth. Historically, these two growth rates have diverged greatly. In the 1950s, electricity grew 180 percent faster than GNP; in the 1960s, 90 percent faster; and in the tumultuous 1970s, 40 percent faster. Thus, our forecasts today diverge from the trends in the past. However, we should not discount the importance of both a healthy economy for electricity demand and a robust electricity supply system for a healthy economy.

For 1985, seven priority issues—a lucky number, I hope—have been identified as EEI's top legislative concerns: taxes, acid rain, CWIP, nuclear, Staggers Rail Act, hydroelectric relicensing, and transmission access.

By the time an issue reaches the Federal legislative arena, everyone involved seems to be on the defensive. The later in the legislative process one enters the game, the more defensive one will be. Our strategic goal is to involve ourselves, as an industry, as early in the legislative process as possible, and more impor-

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By the time an issue reaches the Federal legislative arena, everyone involved seems to be on the defensive.

A major concern of our industry is to preserve capital formation incentives.

tant, to identify and begin responding to issues years before they get to the point of legislative fire fights.

TAXES

Starting with the highly publicized subject of taxes, let me give you briefly the box score for what was achieved in the curtain-raiser year of 1984. EEI and its member companies succeeded in obtaining basically favorable tax treatment in the area of nuclear waste disposal and in certain areas of nuclear decommissioning. Also the present law on tax-deferred dividend reinvestment was successfully preserved, which means that the sunset provision of the law will take effect at the end of this year. On the issue of industrial development bonds, a major means of financing pollution control equipment, we were about 50 percent successful in achieving our objectives.

Now we come to the multibillion-dollar question: where do taxes go from here? The two broad issues in the debate—deficit reduction and tax reform—are obviously going to consume a lot of time and attention of both law-makers and Administration officials over the coming months. At the moment, at least, it appears that deficit reduction has top priority, with prime attention being given to spending cuts. But tax reform cannot be viewed separately. For example, Treasury's comprehensive proposal could very readily be unbundled, and portions of it legislated to reduce deficits *via* the tax increase route.

We are watching developments very closely, and we are geared up to move effectively and quickly to deal with our tax concerns no matter in what context they may appear. A major concern of our industry is to preserve capital formation incentives. The key elements include retention of tax normalization, which has a $38 billion cumulative effect on our industry; and the retention and expansion of an array of capital formation incentives, which are under close scrutiny by the tax restructurers and revenue enhancers.

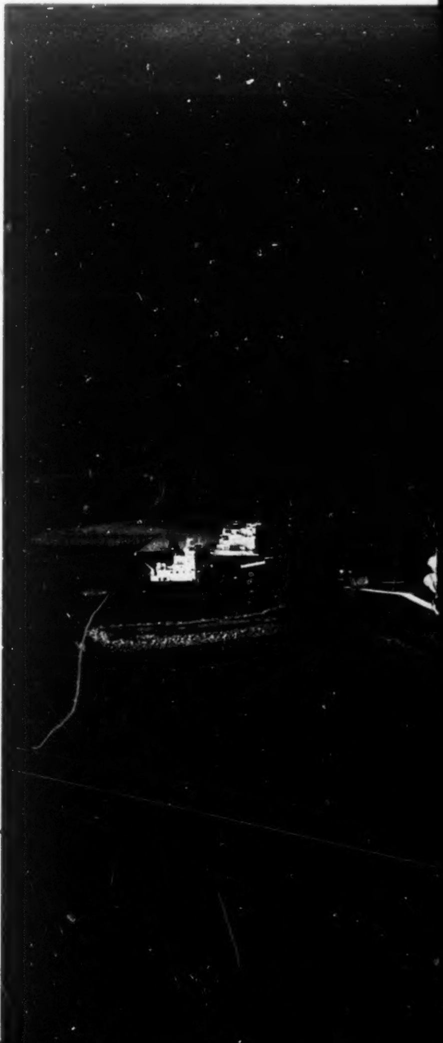
With regard to the Treasury tax proposal issued last November, we are concerned about the assault on capital formation incentives, namely the repeal of the investment tax credit and the shift to the real cost recovery system instead of the current accelerated depreciation—measures which have worked well for the nation and helped the cash flow of our industry.

An additional capital formation objective is the retention and expansion of the use of industrial development bonds, a tax-exempt form of financing which would be extremely beneficial if acid rain legislation does, indeed, come to pass, with costly requirements for control equipment.

ACID RAIN

Acid rain is, of course, a priority issue, along with reauthorization of the Clean Air Act. The principal reason the Act was not reauthorized last year was lack of agreement on the controversial issue of acid rain control. As a measure of the significance of the subject, the Environmental Protection Agency (EPA) has pointed out that between 1970 and 1981, electric utilities invested $11 billion in air pollution control equipment and incurred $42 billion in costs to comply with the Clean Air Act. EPA estimated an additional $26 billion investment and $95 billion in accumulated annual costs in the 1981-1990 decade. Proposed acid rain control bills would raise the cost by another $100 billion, conservatively estimated.

We anticipate efforts to push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for legislative enactment of acid rain controls. However, rapidly developing scientific knowledge is discrediting many hypotheses regarding causes, effects, and proposed solutions; benefits are speculative and elusive, but costs are real and predictable; and the more politicians and consumers learn about the substantial electricity rate increases which would result, the greater their resistance will become.

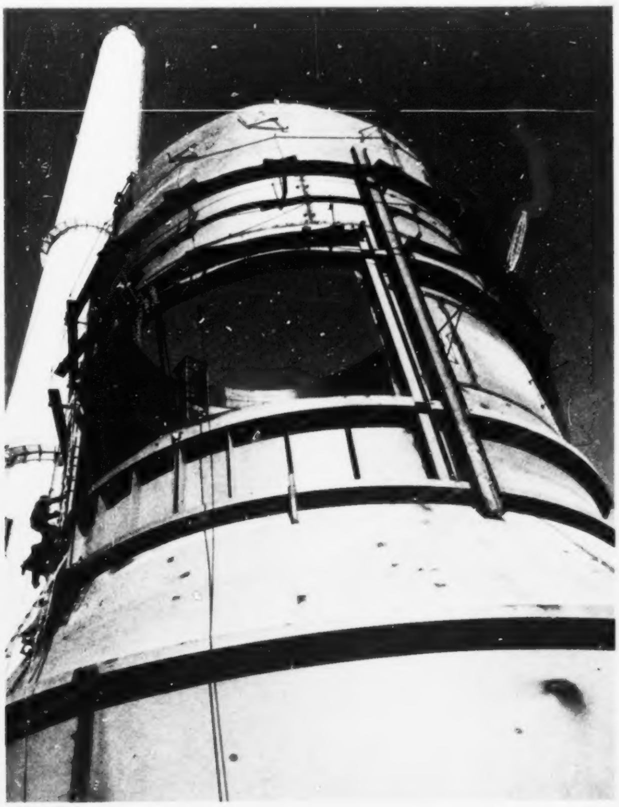
Having successfully withstood acid rain legislation last year, our industry will continue to concentrate on vigorous opposition to any proposals that go beyond intensification of research and mitigation of acidified waters. Although the Congressional committees with jurisdiction have placed reauthorization of the Clean Air Act somewhat lower on their agendas this year, we will be prepared for any eventuality involving acid rain.

CWIP

In another area, our industry's success was also marked by what did *not* happen. As you undoubtedly know, the Federal Energy Regulatory Commission (FERC) issued a rule in May 1983 permitting 50 percent of construction work in progress (CWIP) in a utility's rate base. CWIP in rate base allows a utility to recover part of the interest charges on the principal invested in a facility while it is being built. CWIP in rate base makes good economic sense, prevents rate shock, and results in lower construction costs for the electric utility consumer.

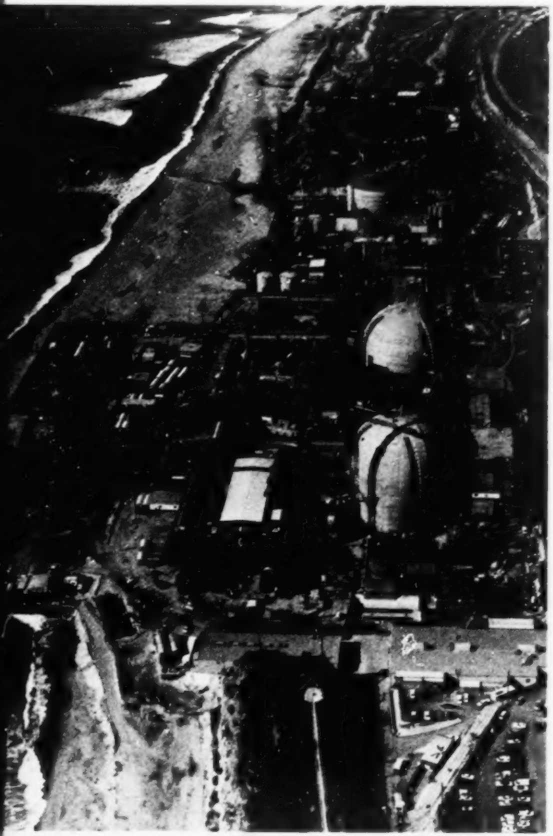
Last year in Congress, CWIP became an issue which engaged EEI and its member companies in legislative maneuverings which almost defy description. But we were successful in blocking passage of anti-CWIP measures, thereby saving consumers some tens of millions of dollars and enabling utilities to have

Between 1970 and 1981, electric utilities invested $11 billion for power plant pollution control equipment. Right: scrubber installation at coal-fired facility.



lower capital costs and greater financial flexibility. Additionally, the fact that the anti-CWIP legislation did not pass signalled to public utility commissions that inclusion of CWIP in the rate base is sound policy. Already the battle on anti-CWIP legislation has begun in the 99th Congress as Representatives Stark (D-CA) and Gedjenson (D-CT) sent a "Dear Colleague" letter announcing their intent to introduce such legislation and inviting other members to be cosponsors. EEI responded in a letter to all members of the House of Representatives that anti/CWIP legislation is anticonsumer and should not be supported. It will be an uphill battle to stop it, but we have already begun the fight.

Nuclear reactors in commercial operation contributed 13 percent of America's electric power last year.



NUCLEAR ISSUES

A priority concern of EEI continues to be what might be generically called nuclear issues. Electricity generated from the atom contributed slightly over 13 percent of the nation's power supply last year, and, ten years hence, we project that figure to exceed 20 percent, with nuclear being surpassed only by coal as a fuel for our nation's essential electricity supply.

Nuclear reactors in commercial operation now total 80—four more than a year ago. Five additional reactors have full power operating licenses and are near commercial operation (not including the two Three Mile Island units). Five units have received licenses to load fuel and/or conduct low power testing.

In the population of plants which are not yet operational, there are today 31 units that have construction permits and for which their owners list definite schedules for completion. This year, as many as eight of these scheduled units could be ready for operating licenses.

The increases in electricity consumption over the past year, and, indeed, in the past month, emphasize the absolute necessity of having nuclear as a substantial part of a sound mix of fuel sources for making electricity. We need strong third-party support to change the general, and

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Electric utilities, which spend about $5.5 billion annually for coal transport by rail, are deeply concerned about their "captive shipper" position.

seriously mistaken, view that electricity supplies will remain ample for the foreseeable future.

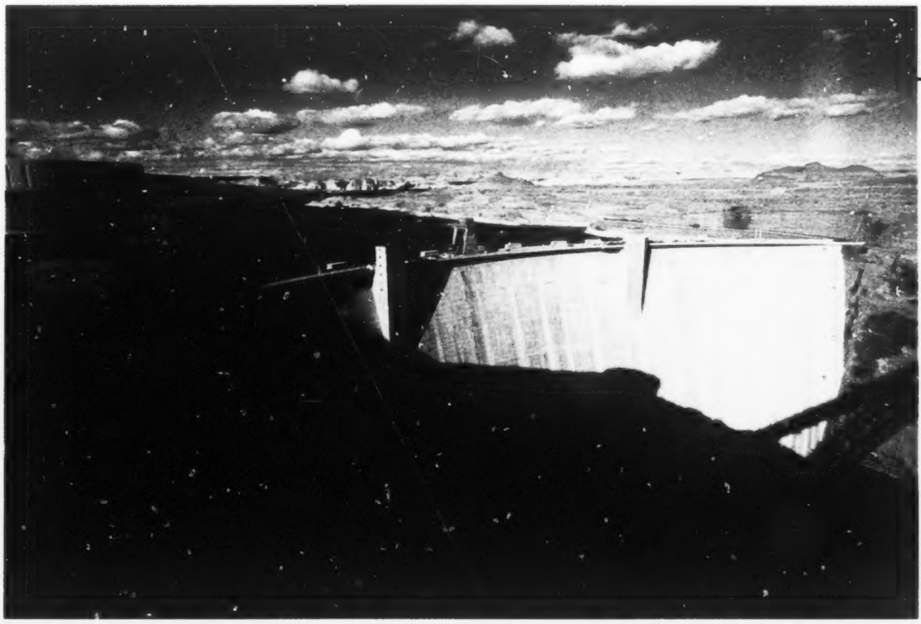
Last June, the EEI Board of Directors established an EEI Task Force on Nuclear Power composed of industry leaders under the chairmanship of T. Justin Moore, Chairman of the Board of Virginia Power. The Task Force was asked to recommend actions that industry and government should take concerning the long-term future of nuclear power. The resulting draft report was approved by the Board at its meeting last month.

The Task Force makes well over a dozen recommendations under the broad heading of reform in the industry and in government regulation of nuclear power. If the recommendations are followed, the result would be to sharply reduce the time and cost required to construct a new nuclear unit and to lessen the risk of unexpected cost increases beyond the control of the utility. *(See Regulatory Review, this issue, for more information on the Task Force's recommendations.)*

RAIL DEREGULATION

Another consumer pocketbook issue is the cost of transporting coal under the current provisions of the Staggers Rail Act, as they are being interpreted by the Interstate Commerce Commission. With an annual coal transportation bill now running at about $5.5 billion, electric utilities are deeply concerned about the "captive shipper" position in which they find themselves.

Some progress was made during 1984 toward amending the Staggers Act—a particularly significant step being the organization, with EEI assistance, of Consumers United for Rail Equity, a broad coalition. As a result of diligent educational efforts, it appears that many Senators and Representatives have received our message. As recent news reports bear out, the railroad lobby is one of the toughest to beat on the Hill. Nevertheless, we feel we have a good shot at a successful legislative effort in the 99th Congress, with the introduction last month by Senator Ford (D-KY) and Representative Rahall (D-WV) of identical bills in the Senate and the House (S.201 and H.R.540), which are practically the same as those introduced in the last Congress.



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Licenses for 177 hydro projects are up for renewal—and possible challenge—through 1993.

HYDRO RELICENSING

On another energy resource front, we laid the groundwork during 1984 for legislative action to protect the interests of millions of electricity consumers. Seventy-six investor-owned electric utility companies hold licenses for 366 hydroelectric projects in 32 states. Millions of customers in 41 states benefit from these fuel-free sources of electricity. Of these projects, 177 will be up for relicensing through 1993. The issue is whether or not the original licensees will be permitted to renew their licenses. Without going into the intricacies of the regulatory process, it has become apparent that legislation is needed to make clear, once and for all, that states and municipalities do not have a preference for existing projects when licenses come up for renewal.

Over the past 80 years, hydroelectric power plants, developed, operated, and maintained by investor-owned electric companies and paid for by electricity consumers in their electric bills, have saved customers billions of dollars annually in avoided fuel costs. If these utilities were to lose their licenses for these projects, their customers face the prospect of higher electric bills, because the alternative sources of electricity supply are more expensive.

We endorsed legislation in Congress last year which would amend the Federal Power Act so that existing license holders—whether or not they are private companies, municipalities, or other entities—would be entitled to a new license unless it could be shown that projects would not be operated in the public interest. As an evident matter of equity, Congress should assure the millions who pay for and benefit from effective operation of hydro facilities that their benefits will not be transferrred to the relatively

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few customers of state and municipal power systems.

The bill I mentioned was reintroduced as H.R.44 last month, with broad and growing support. A companion Senate bill (S.426) went in last week. One reason for moving rapidly in this direction is to attempt to make it more difficult for those in the House or Senate who might try to combine this bill with other bills dealing with issues such as wheeling.

TRANSMISSION ACCESS

This brings us to the question of transmission access—the seventh on our top-priority list. As a result of a National Governors Association policy adopted in 1983 which endorsed regional electricity planning and regulation, legislation was introduced in the House to embody these concepts as well as to provide greater access to transmission systems. Large power customers seek wheeling services and greater competition in bulk power markets as a means of reducing the price they pay for electricity.

This interest in promoting competition has been translated into proposals to impose some form of "common carrier" obligation on electric utilities, either by expanding FERC authority to order a utility to provide wheeling services or by requiring utilities to provide such services to virtually any party upon request, under uniform rates and conditions.

House members gave little serious consideration to such bills introduced last year, at least partly because we made a strong case that the public interest was better served under current law, and that the safety and reliability of the system would suffer under mandatory access to transmission lines. But we fully expect that the issue will be back in the 99th Congress, because interest in transmission access is increasing rapidly among industrial and other customers. *(See "Mandatory Wheeling," this issue, for more information on this subject.)*

The transmission access issue will be back in the 99th Congress.

As you can tell from this brief overview of presently perceived priority concerns, we are trying to be as well prepared as possible to deal with those issues which appear to have the greatest significance for our members and their customers. But if there is one thing certain about Washington, it is the lack of certainty. So we will maintain ourselves in an alert condition, ready to move as necessary no matter what develops. ■

UNDERSTANDING AND MANAGING CUSTOMER ATTITUDES

By Gene Pokorny

Gene Pokorny is President of Cambridge Reports, Inc.

Virtually all executives in the investor-owned electric utility industry agree that the industry's ultimate success depends in large part on improving customers' attitudes toward electricity and the companies that produce it. In fact, the industry probably has conducted as much research into customer attitudes in the last decade as it did during the first three-quarters of this century. Cambridge Reports, Inc., alone has conducted well over 500 surveys for the electric utility industry in the last 10 years. We've interviewed 200-250 thousand electric utility customers and asked them 20-25 million questions.

From that experience and all that data, a general framework of customers' attitudes emerges that members of the industry need to recognize if they are to understand and manage customer attitudes successfully. Once this framework is understood, electric utilities also can identify practices and behaviors that must be changed if utilities are to prosper.

Framework for Understanding

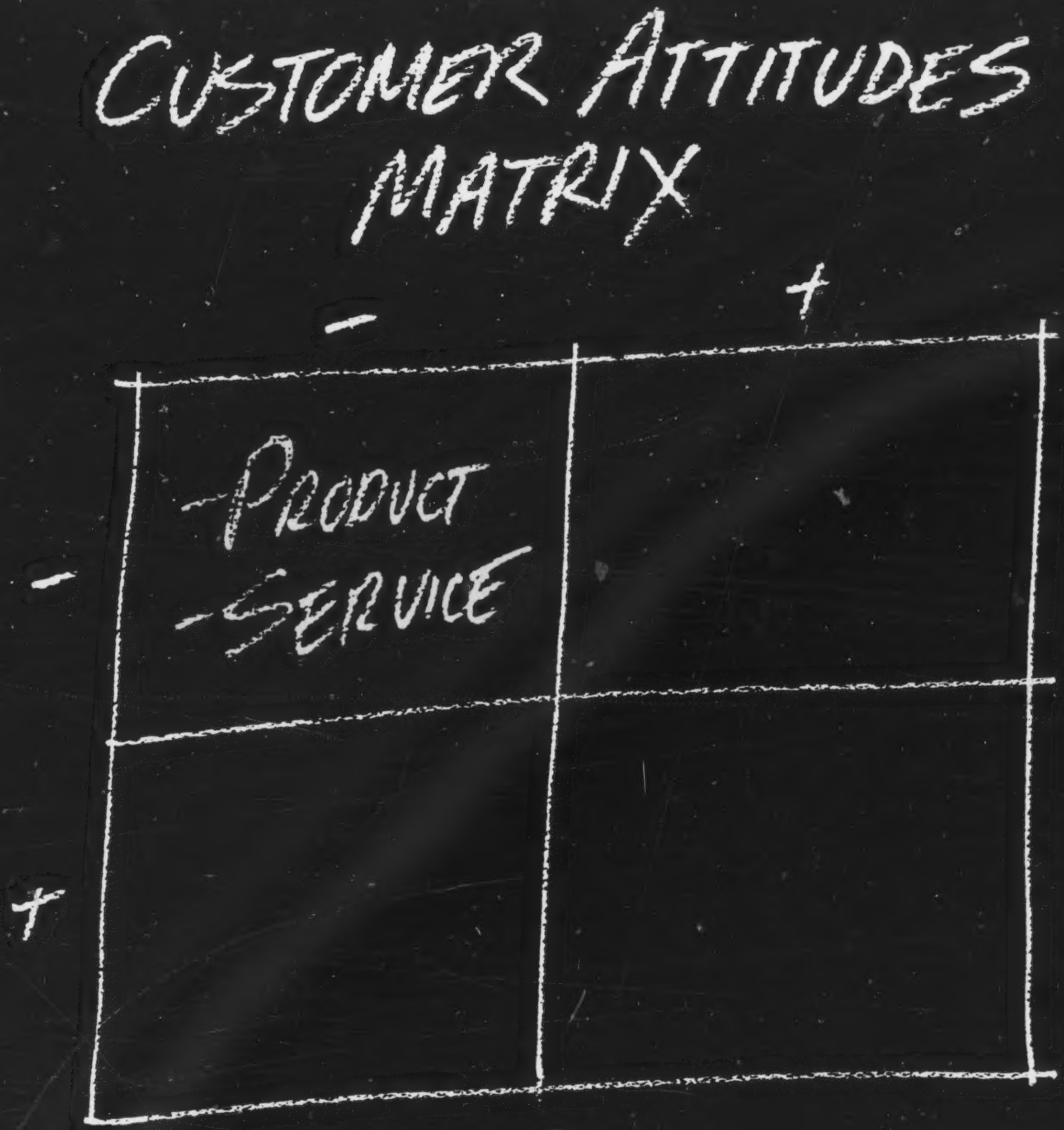
Designing a customer research study forces an electric utility to identify up front what its overall objective is. (To use our research terms, we ask, "What is the dependent variable that you are trying to understand and explain?")

For a communications or public affairs study, the bottom-line objective is almost always customer favorability toward the electric utility industry. Most electric utility executives believe that higher overall favorables will make life easier for the electric utility. There will be less discontent and anger and greater satisfaction among customers. As a result, the electric utility will get along better with public officials and regulators, which, in turn, will help overall company profitability.

For a marketing study, the bottom line can vary depending upon exactly what the particular electric utility is trying to achieve in its market. Some utilities are trying to sell more electricity, and some are not. In either case, the utility is trying to influence, manage, or affect consumer demand for the product. Thus, the bottom line in a marketing study involves convincing customers that they can control and affect their individual need or demand for electricity, and, importantly, its cost to them. If customers believe in this personal control, the electric utility can influence customers' use of electricity to suit its marketing or corporate objectives more effectively.

If these are the objectives (or dependent variables) in most electric utility studies, what satisfies them? What creates favorable customer attitudes, and what gives customers a sense that they control their personal demand for electricity and its cost to them?

In most electric utility customer research studies, the dependent variables are explained by customer information, beliefs, and attitudes in two core areas. First, there is a set of information, beliefs, and attitudes about *the product*—its cost, its value, customers' ability to control their use of the product, etc. Second, there is a set of information, beliefs, and attitudes about *the service*—its quantity, its quality, how the utility treats its customers in all the ways it interfaces with them. In this sense,


CUSTOMER ATTITUDES
MATRIX
–
+
–
+
-PRODUCT
-SERVICE

A utility must have the corporate mentality of a good consumer products marketing firm . . .

service implies more than reliability; it encompasses all the interrelationships a utility has with its customers.

In addition to these two core sets of attitudes, there sometimes is a subordinate third set. This is the information, beliefs, and attitudes customers have about the provider itself—that is, views about the utility as an institution, its management competence and performance. This third set of attitudes often merges with one of the basic two sets depending on how customers feel about their rates. In times of rate unrest or concern, attitudes toward the provider correlate highly with attitudes toward the product. In times of greater rate satisfaction, the correlation is with attitudes toward the service.

Electric utilities are in a unique situation because customers perceive them as both *product* and *service* institutions. Of course, because the product is physically intangible, customers often use service and their relationships with the company as surrogates for the product. Nonetheless, utilities have the advantage of constantly interacting with customers in both product *and* service dimensions.

A simple four-cell matrix captures this situation and suggests the opportunities of being both a product and a service institution in the minds of your customers. The matrix describes the possible range of customer attitudes at any given moment in a utility's corporate life. Where customer attitudes fall within this matrix generally explains the dependent variables utilities usually care about.

Obviously, an electric utility should strive to be in the + product and + service cell, or to be as high on each dimension as possible. How high a utility is on each will directly affect the dependent variables in the communications and public affairs area (favorabilities) and in the marketing area (customers' sense of control over their usage of electricity and its cost.

Our experience at Cambridge Reports suggests that, short of being ranked favorably in both areas, a ranking of + product − service is preferable. That is, product perceptions—particularly perceptions about rates and their fairness—are *primes until pares* between the two core areas of attitudes. Of course, if rates cannot be lowered or made dramatically more "fair" in customers' perception, then the service area rises in importance as a means to influence customer attitudes.

Influencing and Managing Attitudes

An electric utility should not be perceived solely as a product institution or as a service institution. Ideally, it should be superior—and rated highly by its customers—in both dimensions. To achieve this end, what customer attitudes in both areas are desirable and how does a utility achieve them?

In the product area, utilities must create levels of information, evaluations, and understandings that lead customers to value the product (as to both the lifestyle it makes possible and its relative cost) and that give them a sense of personal control over their electricity use and, thus, its cost.

Specifically, research suggests that utilities should show customers that the product is necessary and important to their personal lifestyles and to society overall. Obviously, given the important role rates play in affecting customer attitudes, utilities should lower rates or, at least, keep them as low as possible and make customers aware that this is a goal. When rates must go up, companies must do everything possible to put these rates in better perspective for customers by improving information and perceptions about the value of the product to them as individuals.

At any given level of actual rates, those customers who value the product more highly also feel their rates are more reasonable. If they feel their rates are more reasonable, their overall attitude toward the electric utility is almost always more favorable. This is not to say that there aren't some customers who either feel rates are excessive but who still find the product of high value or feel the rates are fair but the product is of limited value. However, the predominant pattern indicates a high positive correlation between customer feelings about product value and about product price —an observation that will shock no one in the consumer products business.

Finally in the product area, a utility must do whatever it can to alter customers' perceptions

A successful electric utility no longer can be a task-oriented engineering firm . . .

about the control or choice they have over their personal use of the product and the costs they pay for it. In the broadest sense, a company must do everything possible to eliminate customers' feelings of "helplessness" when they confront their need for the product as a necessity over which they feel they can exercise very little choice or control. At any given level of actual rates, those customers with stronger feelings of choice or control over their use of electricity and its cost to them feel better about the product itself, perceive rates as more reasonable, and reveal a more positive overall attitude toward the electric utility.

In the service or relationships area, utilities should create levels of information, evaluations, and understandings that lead to attitudes about service that are as positive as possible. *Service* in this context means more than the technical service of providing a reliable supply of electricity. It encompasses all interactions or relationships a company has with customers through employees. Technical quality of work is not the same as human quality of service, and, in the service arena, customer perceptions of how they are treated are almost always more important than the technical realities. In a sense, customer satisfaction in the service area equals customers' perceptions of how they were treated *minus* their expectations of how they were going to be treated. If the quality of service always exceeds what customers have come to expect, they will be largely satisfied.

Specifically, research suggests that all the things a utility says and does prove whether or not the organization is committed to consumer service and caring. If this is a genuine commitment, customers will perceive it correctly over time. A utility must help customers with their bills by providing cost-control options, alternative rates, and conservation improvements. A utility must show customers that it respects and cares about them by responding to all customer inquiries quickly and courteously, and all utility employees should perform their jobs competently and with the customers' best interests in mind at all times.

When offering customers cost-control options, the issue of outperforming expectations can be very critical. No company should overpromise customers; this will only return to haunt the company. Customers should hear that the utility will be "doing better," not necessarily "doing great." It should also be emphasized that both the electric utility and consumers gain from conservation and demand-shifting practices.

Changing Industry Attitudes

If customer attitudes in the product and service areas are determined by all the things a utility says and does, then it follows that the management of customer attitudes is part of the job description of each and every electric utility employee. This axiom may seem trite, but its significance should not be overlooked. The best marketing or public relations people in the industry cannot change or repair customers' attitudes, if all the rest of the company's employees are damaging them in every way, every day. Every employee has a potential impact on customer attitudes, whether the employee is the voice on the phone who talks with customers or the president who "speaks" to customers through his or her actions and statements.

Marketing and public relations cannot work miracles, particularly if customers perceive a clear discrepancy between what a company says and what it does. If an electric utility honestly wants optimal customer attitudes, then it must engender a total corporate culture from the very top to the very bottom that is consumer-driven. A utility must have the corporate mentality of a good consumer products marketing firm—it must be a superior product and service marketing organization, not just a production organization. A successful electric utility no longer can be a task-oriented engineering firm providing a monopolized product to customers on a take-it-or-leave-it basis.

To influence and manage customer attitudes more effectively a utility must change too and become a true consumer marketing organization with a corporate goal of total customer satisfaction. If the customer's satisfaction is placed first in the corporate culture and customer satisfaction is produced, the profitable generation and marketing of electricity surely will follow. ▰

FINANCIAL REVIEW

EARNINGS PER SHARE DECLINE 3.0 PERCENT; CONSTRUCTION WORK IN PROGRESS UP ONLY 3.1 PERCENT

The investor-owned electric utility industry experienced a 3.0 percent decline in earnings per share in the third quarter of 1984 compared to the third quarter of 1983. The decline reflects the stronger-than-usual increase for the third quarter of 1983, a quarter marked by abnormally warm summer temperatures and the effects of a strong economic recovery. Earnings per share for the twelve months ending September 30, 1984, were up 9.3 percent to $3.16 from $2.89 for the preceding annual period.

The slow growth in kilowatt hour sales during the third quarter is reflected in a relatively low rate of increase in electric operating revenues during the quarter. Sales to ultimate customers increased only 2.0 percent from the third quarter of 1983 to the third quarter of 1984 due in part to a 4.4 percent decline in the weather-sensitive residential sales over that period. As a result, electric operating revenues increased only 7.6 percent during the third quarter of 1984 compared to one year earlier—the lowest increase in five quarters.

The operating ratio (electric operating expenses to electric operating revenues) declined slightly to 79.2 percent during the three months ending September 30, 1984, from 79.3 percent during the third quarter of 1983. The same ratio declined slightly from 81.3 percent during the twelve months ending September 30, 1983, to 80.9 percent during the twelve months ending September 30, 1984. The slow rates of increase in fuel expenses are primarily responsible for the relative stability of the operating ratio.

Interest Coverage Increased

Pre-tax interest coverage including allowance for funds used during construction (AFUDC) increased to 3.12 times interest charges during the year ending September 30, 1984, from 2.94 times one year earlier. Contributing to the improvement was a 16.1 percent increase in income (including AFUDC) before interest and taxes compared to a 9.2 percent increase in interest charges. However, pre-tax interest coverage declined to 3.57 times during the third quarter of 1984 from 3.76 times in the third quarter of 1983. The decline does not indicate deterioration in the industry's financial performance; it mainly reflects the unusually strong third quarter of 1983.

Despite the decline in earnings per share during the third quarter of 1984, earnings quality improved. AFUDC as a percentage of net income available for common declined slightly to 41.6 from 42.0 one year earlier. For the twelve months ending September 30, 1984, AFUDC to net income available for common showed a greater decline, falling from 56.5 percent to 50.5 percent. Total AFUDC increased only 6.3 percent and 3.2 percent during the twelve- and three-month periods, respectively.

ROE Down Slightly

Lower earning levels during the third quarter of 1984 were apparent in the industry's return on average common equity (ROE). For the year ended September 30, 1984, the ROE was 15.0 percent compared to 15.3 percent for the year ending June 30, 1984.

Declining construction expenditures due to the completion, slowdown, or cancellation of major construction projects continued to affect the industry's balance sheet. Construction work in progress increased only 3.1 percent to $100.3 billion as of September 30, 1984, compared to the 18.4 percent increase during the twelve months ending December 31, 1982. Also during this period, deferred debits increased 101.8 percent, from $8.6 billion on September 30, 1983, to $17.5 billion as of September 30, 1984. Of this increase, $6.25 billion is the result of the cancellation of two major construc-

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Table 1

Investor-Owned Electric Utility Industry Statement of Income
For periods ending September 30, 1984 and 1983 (Unaudited) (Millions of Dollars)

	Quarter Ending September 30,			Year Ending September 30,		
	1984	**1983**	**% Change**	**1984**	**1983**	**% Change**
Total Electric Operating Revenues	$33,798	$31,400	7.6	$117,196	$105,722	10.9
Electric Operating Expenses						
Fuel	$10,668	$10,475	1.8	$37,267	$35,361	5.4
Other Operation & Maintenance	7,483	6,437	16.2	28,882	25,912	11.5
Depreciation & Amortization	2,336	2,065	13.1	8,964	8,003	12.0
Taxes Other Than Income Taxes	2,285	2,104	8.6	8,426	7,623	10.5
Income Taxes (Federal & Other)	2,077	1,791	16.0	4,343	3,138	38.4
Provision for Deferred Income Taxes	1,203	1,323	(9.1)	4,836	3,773	28.6
Investment Tax Credit Adjustment, Net	721	701	2.9	2,042	2,164	(5.6)
Total Electric Operating Expenses	$26,773	$24,896	7.5	$94,760	$85,974	10.2
Electric Operating Income	$7,025	$6,504	8.0	$22,436	$19,748	13.6
Other Utility Operating Income	124	77	61.0	1,485	1,040	42.8
Total Utility Operating Income	$7,149	$6,581	8.6	$23,921	$20,788	15.1
Other Income	495	452	9.5	2,007	1,455	37.9
Allowance for Other Funds Used During Construction	1,314	1,297	1.3	5,182	4,842	7.0
Total Income Before Interest Charges	$8,958	$8,330	7.5	$31,110	$27,085	14.9
Interest Charges						
Interest on Long Term Debt	$3,518	$3,154	11.5	$13,395	$12,213	9.7
Other Interest Expenses & Charges	347	286	21.3	1,201	1,149	4.5
Allowance for Borrowed Funds Used During Construction	(851)	(801)	6.2	(3,261)	(3,104)	5.1
Net Interest Expenses & Charges	$3,014	$2,639	14.2	$11,335	$10,258	10.5
Net Income Before Extraordinary Items	$5,944	$5,691	4.4	$19,775	$16,827	17.5
Extraordinary Items	0	2	(100.0)	(166)	(32)	418.8
Net Income	$5,944	$5,693	4.4	$19,609	$16,795	16.8
Preferred Dividends Declared	734	701	4.7	2,902	2,737	6.0
Net Income Available for Common	$5,210	$4,992	4.4	$16,707	$14,058	18.8
Common Dividends Declared	2,746	2,602	5.5	10,842	9,913	9.4
Retained Earnings	$2,464	$2,390	3.1	$5,865	$4,145	41.5
Avg. Shares Outstanding	5,407	5,019	7.7	$5,287	$4,869	8.6
Earnings Per Share*	$0.96	$0.99	(3.0)	$3.16	$2.89	9.3
Common Dividends Per Share*	$0.51	$0.52	(1.9)	$2.05	$2.04	0.5

*Based on average shares outstanding as reported to EEI by survey respondents and adjusted for stock splits.
NOTE: Revenues are adjusted for intra-industry sales for resale of electricity.

Table 2

Investor-Owned Electric Utility Industry Balance Sheet
As of September 30, 1984 and 1983 (Unaudited) (Millions of Dollars)

Assets	**1984**	**1983**	**% Change**
Utility Plant*			
Utility Plant (Including Nuclear Fuel)	$294,953	$269,096	9.6
Less Accumulated Depreciation	83,677	75,697	10.5
Less Property-Related Accumulated Deferred Income Taxes	4,396	3,922	12.1
Total	$206,880	$189,477	9.2
Construction Work in Progress	100,265	97,239	3.1
Net Utility Plant	$307,145	$286,716	7.1
Investments	7,209	6,325	14.0
Current Assets	36,835	32,871	12.1
Deferred Debits	17,453	8,649	101.8
Total Assets	$368,642	$334,561	10.2

Capitalization & Liabilities			
Capitalization			
Common Stock	$77,872	$72,124	8.0
Retained Earnings	40,566	34,635	17.1
Preferred Stock	31,910	30,963	3.1
Long-Term Debt	139,023	129,252	7.6
Total Capitalization	$289,371	$266,974	8.4
Current Liabilities			
Short-Term Debt	$5,162	$5,110	1.0
Long-Term Debt Due Currently	4,200	3,734	12.5
Other Current Liabilities	27,723	24,313	14.0
Total Current Liabilities	$37,085	$33,157	11.8
Deferred Credits			
Accumulated Deferred Income Taxes	$21,178	$17,417	21.6
Accumulated Deferred Investment Tax Credits	14,120	12,079	16.9
Other Deferred Credits	6,888	4,934	39.6
Total Deferred Credits	$43,186	$34,430	22.5
Total Capitalization & Liabilities	$368,642	$334,561	10.2

*Includes other utility plant of combination gas and electric companies.

tion projects and the restatement of these costs from construction work in progress to a deferred account.

The growth in accumulated retained earnings continued to outperform all other components of the industry's capital structure, strengthening the industry's financial flexibility. Accumulated retained earnings increased 17.1 percent from September 30, 1983, to September 30, 1984, and contributed to the increase of the industry's equity ratio to 40.9 percent as of September 30, 1984, up from 40.5 percent three months earlier and from 39.5 percent a year earlier. The industry's long-term debt ratio declined to 48.0 percent as of September 30, 1984, from 48.7 percent one year earlier.

Tables 1 and 2 are based on unaudited reports submitted by a sample of electric and combination companies. The sample accounts for 95 percent of the industry's revenue from sales to ultimate customers and 94 percent of the industry's total assets. The data was expanded to represent the entire investor-owned electric utility industry.

Contributed by the Finance Department of Edison Electric Institute.

REGULATORY REVIEW

TASK FORCE ADVOCATES NUCLEAR REFORM

A new nuclear unit is now an option no American utility will choose, according to a new report of the Edison Electric Institute (EEI). The report claims the costs and risks of nuclear development have become unacceptably high for U.S. utilities and that major reforms are necessary if nuclear power is to remain a viable energy option.

The report, prepared by the Task Force on Nuclear Power established by EEI's Board of Directors last June, was approved by the Board earlier this year. Chaired by T. Justin Moore, Chairman of Virginia Power, the task force was composed of industry executives. Its charge was to recommend actions that industry and government should take concerning the long-term future of nuclear power.

In assessing the need for nuclear power, the task force concludes that America will need between 100 and 200 million kilowatts of additional generating capacity before the year 2000. To meet this need, the report says, the United States should begin now to take steps that will make nuclear power an option utilities can consider.

The electric utility industry is not attached to nuclear power for its own sake, the task force points out. Rather a utility's interest and obligation is to provide reliable electric service at the lowest cost. Reform is advocated because it is believed that nuclear power, if sensibly managed and governed, can again play an important role in achieving that objective.

The task force makes a number of recommendations designed to guide this nation toward a reliable and sensible energy policy. The first is the early appointment of a National Commission on Electricity to make independent judgments on the future growth of electricity demand and the means for meeting that demand.

The task force further suggests that the Commission evaluate how utilities could again venture into major plant construction economically and that it recommend which generating options should be available. If the Commission reaches the conclusion that nuclear power should remain as one of several future generating options, then the Commission should examine changes needed by both industry and government to allow utilities again to consider ordering new nuclear units.

The task force also recommends that electric utilities address major reforms. In addition to maintaining excellence in the operation of existing nuclear plants and continuing the record of safe nuclear operations, electric utilities should prepare for greater use of joint ventures and separate nuclear companies as a means of spreading risk and achieving better matches between capacity additions and load growth. They also should develop nuclear units only through contracts providing for sharing of the risk of cost increases with nuclear suppliers. Those suppliers, in turn, should adopt and present for licensing standard designs for new nuclear power units.

The task force also recommends reforms in federal law and regulation, so that:

- standard nuclear plant designs are approved, and plants built according to those designs are licensed promptly;
- nuclear plant sites are considered and approved in advance of an application to construct a plant, allowing for public participation before ground is even broken;
- new regulations governing backfits would be adopted only if they would clearly produce substantial benefits to public safety;
- a single license would permit construction and operations once the Nuclear Regulatory Commission (NRC) had determined that the plant as built conformed to the approved design and met quality standards; and
- NRC hearings would more closely resemble legislative hearings and be limited to previously unresolved issues concerned with nuclear safety.

The task force also recommends several structural changes within NRC to improve the organization's effectiveness and efficiency; calls for resolute action to implement existing Federal legislation to provide for the safe, permanent disposal of radioactive nuclear waste; and recommends an extension of the Price-Anderson Act with the continuation of a cap on utilities' total liability.

The task force believes, ". . . the conditions that now make new nuclear orders unattractive to utilities are not inherent in the technology but result from the ways in which nuclear power has been regulated by our government and managed by our industry.

"It would be wrong to suggest that the utilities or the architect, engineers, and nuclear suppliers have been blameless or that all the problems of nuclear power arise from deficiencies of law and regulation and the activities of nuclear opponents.

"We recognize that our assessment will be challenged as self-interest," the task force said. "We offer it not with the expectation that it will be accepted but rather with the hope that it will prompt a process of evaluation that will be generally regarded as realistic and unbiased."

Even if recent construction periods for generating units are reduced, the development of economical new generating capacity will still require a number of years. It is therefore timely to begin taking the steps that will make it possible for America's electric utilities to serve future electricity demand fully and at the lowest possible cost.

"To do so, we must have the wisdom to look ahead, to understand what our situation requires and to act realistically on that understanding," the report concludes.

Contributed by The Information and Publishing Services Department of Edison Electric Institute.

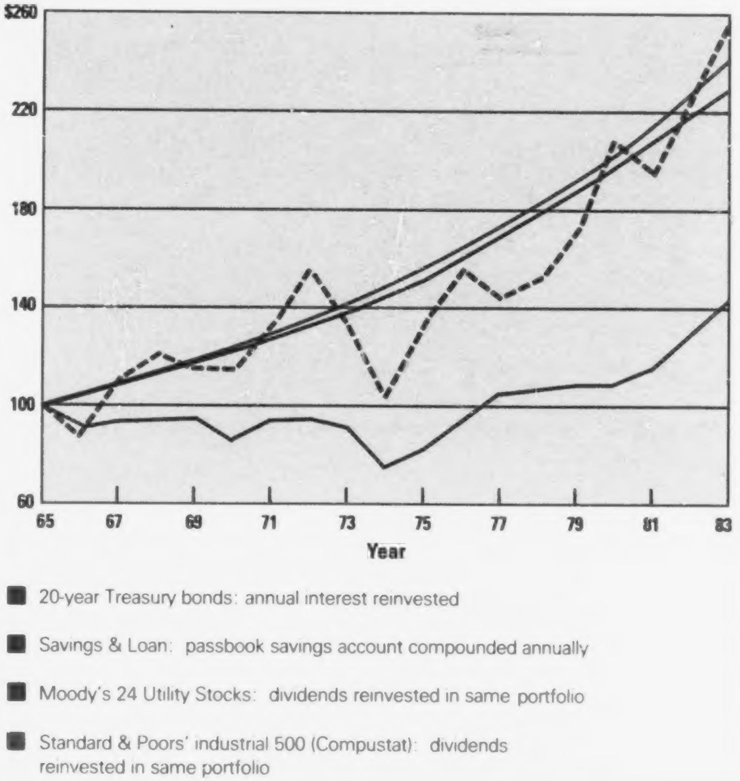
REVIEWS

FOR PERSPECTIVE

TURNING THE CORNER

The utility stock index has climbed dramatically over the last couple of years, giving financial analysts, regulators, and environmental groups the opportunity to argue how "profitable" it has been to own utility stocks. Still, compared to other, less risky investments, utility stocks continue to lag behind—as, in fact, they have since 1965 (see Figure 1).

Figure 1
Investment Alternatives If $100 Were Invested



The past ten years in particular have been a period of financial distress for many companies within the electric utility industry, as unpredictable changes have been all too common. However, these changes have prompted utilities to explore new paths to financial health in areas such as diversification, load management, and energy-resource strategies.

In addition, over the last couple of years many electric utilities have turned the corner in terms of construction expenditures. In fact, preliminary estimates indicate that last year the industry as a whole may have experienced the first decline in annual construction expenditures since 1975.

Thus, despite the reports of plant cancellations and financial troubles that seemed to fill the newspapers, in 1983 and 1984 many companies registered sound improvements in financial flexibility and health. Moreover, both of the trends that are largely responsible for this recent financial renaissance—increasing flexibility and decreasing construction expenditures—are expected to continue as the industry works to climb out of the financial quagmire of the last decade.

In short, the industry's performance over the last couple of years has brightened the near-term outlook for utility stockholders, especially when compared to the distressing history of the last decade or two. Although electric utility stocks still have a lot of catching up to do, utilities will continue to develop new financial and technological strategies to improve their ability to serve their customers economically and to preserve the interests of their investors.

Contributed by Marshall Baker, Operations Analyst, Finance Division, Edison Electric Institute.

REVIEWS

STATISTICAL REVIEW

Table 1
Sales Turnover—Time Basis

Industry	Revenue Equals Assets*
Investor-Owned Electric Utilities	Once every 2 years, 8.9 months
Mining	Once every 2 years, 2.4 months
Railroads	Once every 1 year, 4.8 months
Tobacco Manufactures	Once every 1 year, 3.5 months
Machinery, Except Electrical	Once every 1 year, 0.1 months
Chemicals and Allied Products	Once every 11.1 months
Iron and Steel	Once every 11.6 months
Investor-Owned Gas Utilities and Pipeline Industry	Once every 8.5 months
Food and Kindred Products	Once every 6.2 months
Motor Vehicles and Equipment	Once every 6.9 months
All Manufacturing Corporations	Once every 9.4 months

*Average net assets for fiscal 1983

NOTE
The Communications industry ranked high in earlier listings of turnover ratios, but is not shown here since the recent breakup of AT&T has rendered the ratio meaningless.

SOURCES
EEI, Statistical Yearbook; Moody's, Public Utility Manual; AGA, Gas Facts; Federal Trade Commission, Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations; Association of American Railroads, Yearbook of Railroad Facts.

SALES TURNOVER

The electric utility industry differs from most other industries in that electricity is a product tangible only in the service it performs. Because the production and distribution of electric power by the company and its use by the customer occur almost simultaneously, electricity must be "made to order" every time a customer employs any of its thousands of applications. Electric utility companies cannot generate electricity to store for future demand; at any instant, they must have facilities to meet the maximum demand for electricity. In addition, electric utility companies must maintain and operate transmission and distribution facilities.

Consequently, electric service requires a tremendous capital investment in plant and equipment. Revenue from almost three years of electricity sales is required to match the electric utility industry's assets. In a manufacturing industry, however, the sales revenues of one year are usually greater than the amount of capital investment. For instance, the motor vehicles and equipment industry turns over its capital almost twice a year (see Table 1). In other words, each year the motor vehicle industry generates $1.00 in revenue for each $0.58 of assets, whereas the investor-owned electric utility industry needs $2.74 of assets to generate $1.00 of revenue (see Table 2).

Contributed by the Statistics Department of Edison Electric Institute.

Table 2

Sales Turnover—Dollar Basis

Industry	Assets Per $ of Annual Revenue			
All Manufacturing (a)	$0.78			
Nondurable Manufacturing Industries		$0.76		
Food and Kindred Products			$0.51	
Tobacco Manufactures			1.29	
Textile Mill Products			0.54	
Paper and Allied Products			0.83	
Printing and Publishing			0.69	
Chemicals and Allied Products			0.93	
Industrial Chemicals & Synthetics				$0.98
Drugs				1.13
Petroleum and Coal Products			0.94	
Rubber and Misc. Plastic Products			0.61	
Other Nondurable Mfg. Industries			0.49	
Durable Manufacturing Industries		0.81		
Stone Clay and Glass Products			0.84	
Primary Metals Industry			0.99	
Iron and Steel				0.97
Nonferrous Metals				1.02
Fabricated Metal Products			0.68	
Machinery, Except Electrical			1.01	
Electrical & Electronic Equipment			0.80	
Transportation Equipment			0.69	
Motor Vehicles and Equipment			0.58	
Aircraft, Guided Missiles & Parts			0.84	
Instruments & Related Products			0.90	
Other Durable Mfg. Industries			0.61	
Mining (a)	2.20			
All Wholesale Trade (a)	0.31			
Wholesale Trade, Durable Goods		0.43		
Wholesale Trade, Non-durable Goods		0.27		
All Retail Trade (a)	0.42			
General Merchandise Stores		0.59		
Retail Food Stores		0.24		
All Other Retail Trade		0.49		
Investor-Owned Electric Utilities (b)	2.74			
Railroads (b)	1.40			
Investor-Owned Gas Utilities And Pipeline Industry (b)	0.71			

NOTES

(a) Based on second quarter (1984) information from FTC's QFR.

(b) Annual data compiled from listed sources for fiscal year 1983.

SOURCES

EEI, Statistical Yearbook; Moody's, Public Utility Manual; AGA, Gas Facts; Federal Trade Commission, Quarterly Financial Report for Manufacturing, Mining, and Trading Corporations; Association of American Railroads, Yearbook of Railroad Facts.

REVIEWS

BOOK REVIEW

THE MARKETING IMAGINATION

Theodore Levitt
The Free Press, 1983
New York, 193 pps.

By K. Michael McGrath

"The purpose of a business is to create and keep a customer." Upon this challenging statement, Theodore Levitt builds the case that the marketing discipline is evolving rapidly to meet the needs and opportunities provided by the world economy. Sure to be of interest to marketing executives, Levitt's book explores the role of marketing in both the industrial and service sectors of the economy, and makes a compelling case for the importance of "the marketing imagination" in business success.

Analyzing the performance of a number of successful and unsuccessful businesses, Levitt identifies a constant of success: "that there can be no effective corporate strategy that is not marketing oriented, that in the end does not follow this unyielding prescript: The purpose of a business is to create and keep a customer. To do that, you have to do those things that will make people want to do business with you."

Levitt goes on to explain how strong industrial businesses make customers want to do business with them. They do so by looking carefully at potential customers and finding what needs they have in common, and by meeting those needs as productively and imaginatively as possible. The result can be a global corporation, offering products perceived as so desirable and competitively priced that product nationalization becomes unnecessary. The real trick in this process is to identify the customers' needs and find a method to satisfy them. Herein lies the requirement for genius and imagination, by definition a trademark of a global industry. This globalization of industry is already underway, and localized, less imaginative industries lacking great economy of scale will find it unprofitable to compete.

In larger industries providing standardizied products, success becomes more complicated. Such industries, by virtue of being efficient, find it difficult to compete on the basis of price, since product price alone does not adequately differentiate one company from another. Accordingly, a successful industry must find a way to differentiate its products. One of the better methods is to position the product as a superior solution to a customer's problem. For example, Levitt points out that customers really don't need computers, instead they need to calculate, track, manipulate, and store information. Much of the well known success of IBM can be attributed to the fact that IBM has packaged its computers with the customer's needs in mind. IBM products come with appropriately customized software and with training and user support designed to guarantee that the customer's needs are met. As a result of this strategy, IBM is one of the world's foremost computer companies, in spite of the fact that other computer companies offer machines with price performance ratios equal to IBM's.

Although Levitt does not directly address the highly regulated electric utility business, the electric industry does represent a large and efficient industry providing a highly standardized product (or service). One can assume that Levitt would insist that electric companies take great pains to understand the needs of their customers, recognizing that customers do not need electricity per se, but require warmth, cooling, light, mechanical motion, etc. None of these customer needs absolutely require the existence of a profitable investor-owned electric utility industry. He would surely maintain that industry success will involve both packaging electricity in ways that better meet customer needs and differentiating electricity from other energy forms, such as oil, natural gas, or photovoltaics.

Levitt offers a provocative explanation for why the U.S. economy appears to be moving from a manufacturing-oriented economy towards a service-dominated economy. He points out that on an overall productivity basis, the manufacturing industry far outstrips the service industry. As a result, less per person value is required per unit output in the manufacturing industry. Thus, service industries appear to be growing faster than manufacturing industries, when, in reality, service industries are requiring a larger share of the economy's resources because they are less efficient. Vigorous competition and efficiency also will come to the service industries, and they too will be challenged to meet customer needs in more efficient, imaginative ways. Evidence of such trends in the service industries include companies such as McDonalds, which is combining efficiency with marketing acumen to reach for global domination of the fast food business.

Arguing in an exuberant style, Levitt makes a strong case that imaginative marketing and good management are the most important attributes of successful businesses. Although marketing in the electric utility business is unlike marketing in unregulated businesses, Levitt's approach to the subject is, at the very least, thought provoking. This reviewer highly recommends placing *The Marketing Imagination* on the reading list of electric industry executives.

Michael McGrath is a Director of Technical Services for Edison Electric Institute.

TECHNOLOGY REVIEW

UNICOM UPDATE

After Tom Morron, Edison Electric Institute's Vice President of Customer Services and Marketing, suffered a back injury last summer, he soon discovered the frustrating side effects of a four-month prescription for rest and quiet. "As you progress, the novely of bed rest wears off quickly. You can't be active, but you long to have something to take your mind off your discomfort. The quiet rings in your ears, and you think of all the important work that needs to be done at the office."

What Tom needed was a means of conducting business from his bedside at his own convenience. He needed to be able to communicate with his staff and to review their work when he wanted to and to rest undisturbed when he needed to.

UNICOM

Aware of Tom's dilemma, EEI's Information and Publishing Services Department provided Tom with a near-term solution to his problem. Norm Rubenstein, Director of the department, recalls, "We immediately saw a way to help Tom with the electronic mail capability of our UNICOM Service, which he already knew how to use since he was an early subscriber."

UNICOM, the Utility News and Industry Communication Service, is a news, information, and communication system that EEI created over a year ago for the electric utility industry. Currently addressing roughly 250 people, UNICOM now links over 85 EEI member companies and affiliated organizations. The system, developed by Information, Inc. for EEI, was designed to keep electric utility professionals in touch with one another and to provide them with the most current news about their industry.

"The solution to Tom's dilemma couldn't have been simpler," explains Rubenstein. "We took some desktop computer equipment out to Tom's house and connected it to the phone next to his bed. When Tom wanted to communicate with his office, he simply composed electronic mail letters to his staff and used the simple command that sends them instantly. His staff, in turn, could draft lengthier documents on a word processor, upload that material into their electronic filing cabinet, and whisk it off for Tom to read at his convenience."

The principle involved in linking Tom to EEI also makes it possible for EEI, its member companies, and related organizations such as the Electric Power Research Institute, the Atomic Industrial Forum, the Institute of Nuclear Power Operations, and the National Electric Reliability Council to communicate with each other. Subscribers can enter text of any length—from 2-line messages to 20-page reports—and transmit them instantly to one or more network participants.

UNICOM also offers users access to over 180 information services and files—many of them part of a unique electric utility industry news bureau available nowhere else. By entering a number or combination of numbers, subscribers with no previous computer experience quickly locate the information they need.

Amost any personal computer, dumb terminal, or word processor outfitted with a communication software package and a modem can access UNICOM. The modem translates the signal from the user's equipment through telephone lines to UNICOM's powerful host computer in Virginia. Through a packet-switching telecommunication network, all calls to the computer from major metropolitan areas are rendered local, keeping costs down. The host computer serves as a post office, storing mail until users collect it. It also stores UNICOM's unique information files and permits subscribers to search some of them by keyword. Guaranteeing a high degree of security, the host computer checks a unique ID and password combination each time a user seeks access to the service.

Since its genesis, UNICOM has been continually refined and expanded, the most recent development being an offshoot known as the UNICOM CEO Service. Designed exclusively for use by EEI member-company chief executives, the service offers files and features not available on the standard UNICOM master menu, including CEO letters and an industry stock feature. It also enables CEOs to communicate with one another as well as with other system subscribers, and it encapsulates the most current news bureau features of the standard UNICOM Service.

CEOs who stopped by to view the new service in action at EEI's January CEO Conference in Scottsdale, Arizona, witnessed two timely applications. Communication Vice President Bill Brier sent his latest press release to EEI headquarters in Washington electronically—obviating the need to dictate a lengthy release over the phone. And conference planners, anxious to ascertain the schedule of Secretary Donald Hodel, who was scheduled to address the CEO meeting the morning following Reagan's announcement of plans to shift Hodel from Energy to Interior, regularly searched the UPI and AP wires on-line; by keying in Hodel's name, they obtained stories only about him and in the sequence they requested.

EEI's Brier notes, "Most of our service is industry-specific. We took great care to fashion the news bureau component of UNICOM so that it addresses utility industry employees' needs. However, whenever we can create a file that responds to the needs of a segment of our subscriber base, we'll endeavor to do that." ■

(For additional information about UNICOM or the UNICOM CEO Service, contact Norm Rubenstein, Director, Information and Publishing Services, 202/828-7593 or UNICOM ID EE1059.)

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